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April 29, 1988

Lorelei Joy Morland, Esquire
Edwards & Angell
430 Park Avenue
New York, New York 10022

Re: Bluff Road Site, South Carolina

Dear Lorelei:

Enclosed is a copy of the executed Administrative Order
by Consent for the Bluff Road RPL Site. The Order includes
the approval by the Deputy Attorney General, copies of the
signature pages, and Appendices A, B, C and D.

If you have any questions, please call me.

Sincerely,

ANNE L. ASBELL
Associate Regional Counsel
Hazardous Waste Law Branch

Enclosure

cc: Quentin Fair
Dept of Justice

bc: Michelle Glenn w/Enclosure
Dick Green w/Order, App A & B
OWPE w/Order, App A & B
OECM w/Order, App A & B

ASBELL

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~~Yellow~~

MEMORANDUM

DATE: MAR 01 1988

SUBJECT: Administrative Order by Consent;
Bluff Road Site, South Carolina

FROM: Patrick M. Tobin, Director
Waste Management Division
/s/ Lee A. DeHihns, III
Acting Regional Administrator

TO: Lee A. DeHihns, III
Acting Regional Administrator

Attached is the Administrative Order by Consent for the conduct of the RI/FS for the Bluff Road Site for your review and signature. There are several unusual aspects to this Administrative Order by Consent and a brief summary of the background and events leading to the Order may be helpful.

The Bluff Road Site is part of the SCRDI case and was placed on the NPL in October 1981. Suit was instituted in the early 1980's and in late 1982 a Partial Settlement Agreement was negotiated and finalized with a number of PRPs. The Partial Settlement Agreement provided for payment of certain sums by the Settlers for the surface cleanup of the Site. It also released the Settlers from further studies, such as the RI/FS, and other "Covered Matters," but retained their liability for groundwater cleanup. There are differences of opinion as to the "release" granted in the 1982 Partial Settlement Agreement, but the Department of Justice opinion is that the parties who settled in 1982 with the United States were released from RI/FS costs.

Other PRPs in the Bluff Road litigation refused to settle and proceeded with the litigation. In 1984, the U.S. prevailed in a Motion for Summary Judgment on liability and in November 1985, an Order was filed awarding the U.S. all costs of the response action. In August 1986, an Order for \$1.5 million was entered against Allied, Monsanto, and E. M. Industries, the "Litigators." An appeal was taken and the matter was argued before the 4th Circuit in October 1987.

Following the 1982 Agreement, the State of South Carolina proceeded with the surface cleanup of the Site and the RI/FS. At some point in 1986, the EPA requested South Carolina to return the project to

For. U.

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State/PRPs

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the Agency for additional RI/FS work. The State did so and in May 1987 EPA initiated Section 122(e) moratoria letters to known PRPs, including previous Settlers, Litigators and non-Settlers from the prior litigation. The efforts to obtain a PRP funded RI/FS were unsuccessful and were concluded in September 1987.

In early October 1987, a group of PRPs, who were "Settlers" from the 1982 Agreement proposed to voluntarily conduct the RI/FS in return for a credit against their future RD/RA liability and a "cap" on that future RD/RA liability. The Department of Justice was interested in the offer and EPA and DOJ explored the possibility of such an agreement. The matter was presented to the Settlement Decision Committee (SDC) on December 14, 1987. After discussion, the SDC declined to accept the Settlers' offer. The main reason for the SDC decision appeared to be that the total percentage of contribution by the Settlers was only 17% of any future RD/RA costs. The SDC indicated that if the amount of contribution had been greater, the decision might have been different.

In early January 1988, the Department of Justice was again contacted by the Settlers and the PRP offer was revived. As a result, during January and February 1988, there were intense negotiations with the Settlers' spokesperson regarding an RI/FS order which would contain a cap on future RD/RA liability for PRPs who participated in the RI/FS.

The Administrative Order by Consent was negotiated and agreement reached in a remarkably short time period. The major provisions of the Order provide:

1. The RI/FS will be 100% financed and conducted by the Respondents;
2. The Respondents are in two categories: Performing and Non-Performing Respondents;
3. Performing Respondents will conduct or contract for the conduct of the RI/FS, as well as pay their percentage share of the RI/FS costs, and their percentage of the RD/RA costs;
4. Non-Performing Respondents will pay their percentage share of the costs of the RI/FS and their percentage of the RD/RA costs;
5. The Order provides for responsibilities and obligations for both categories of Respondents;
6. The Order provides for an escrow account to be established and funded by the Respondents within 45 days of the signing of the ROD;

7. The Respondents are jointly and severally liable for 100% of the RI/FS costs and 51.96% of the RD/RA costs and 51.96% of the 10% share attributable to the bankrupt and insolvent PRPs. The Respondents will receive a credit (dollar for dollar) for the RI/FS costs and their RD/RA costs are fixed at the 51.96% contribution.

This Administrative Order by Consent results in a PRP-funded RI/FS and guarantees the Agency at least 51.96% of the RD/RA costs. The Respondents are, in large part, previous Settlers who voluntarily initiated the effort to conduct the RI/FS and have indicated a strong interest in performing the RD/RA at the appropriate time. The Order contains the provision of a cap on RD/RA liability, but preserves the joint and several liability position of the Agency with these Respondents and all other PRPs.

OWPE and DOJ have exhibited a high degree of interest in this Order. DOJ actively participated in the negotiations for the Order and is obtaining the necessary concurrence for the partial settlement of the RD/RA costs.

I recommend you approve and sign the attached Administrative Order by Consent for the Bluff Road Site.

Attachment

ASBELL/elisa/2-29-88/TELEX/doc 034

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0002B

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV

IN THE MATTER OF:

BLUFF ROAD SITE

ABBOTT LABORATORIES,
ALBANY INTERNATIONAL CORP.,
AMAX MINERAL RESOURCES CO.,
AMERICAN CYANAMID CO.,
AT & T TECHNOLOGIES, INC.,
BORDEN, INC.,
CAROLINA EASTMAN COMPANY,
CAROLINA STEEL & WIRE CORP.,
CHAMPION ROAD MACHINERY
INTERNATIONAL CORP.,
CHEM SERVICE, INC.,
CIBA-GEIGY CORP.,
COGSDILL TOOL PRODUCTS, INC.,
DEFENDER INDUSTRIES,
DENNISON MANUFACTURING CO.,
E.I. du PONT de NEMOURS &
COMPANY,
EATON CORPORATION,
ETHYL CORPORATION,
FABERGE,
GENERAL ELECTRIC CO.,
GEORGETOWN FERRE REDUCTION,
W.R. GRACE & CO.,
HOECHST CELANESE CORP.,
INMONT CORP.,
INTERNATIONAL BIO-SYNTHETICS,
INC.,
3M CORP.,
MEPCO CENTRALAB CO.,
MILLIKEN & CO.,
MOBAY CORP.,
MORTON THIOKOL, INC.,
RISDON ENTERPRISES, INC.,
SANDOZ CHEMICALS CORP.,
STATE PRINTING,
J.P. STEVENS & CO., INC.,
SUN REFINING & MARKETING CO.,
SYNTEX CHEMICALS, INC.,
THERMODISC, INC.,
THOMASVILLE FURNITURE
INDUSTRIES, INC.,

) Proceeding Under Section
) 104, Section 106(a), and
) Section 122 of the
) Comprehensive Environmental
) Response, Compensation,
) and Liability Act of 1980,
) as amended, 42 U.S.C.
) Section 9604, Section
) 9606(a), and Section 9622

) EPA DOCKET NO. 88-16-C

UNION CARBIDE CORP.,)
 VERMONT AMERICAN CORP.,)
 WESTINGHOUSE ELECTRIC CORP.,)
 WESTVACO CORP.,)
 WINSTON MILLS, INC.,)
 YORK TAPE & LABEL COMPANY,)
 Respondents.)

ADMINISTRATIVE ORDER BY CONSENT

I. JURISDICTION

This Administrative Order by Consent (hereinafter called Consent Order) is entered into by the United States Environmental Protection Agency (hereinafter called EPA) with Abbott Laboratories, Albany International Corp., Amax Mineral Resources Co., American Cyanamid Co., AT & T Technologies, Inc., Borden, Inc., Carolina Eastman Company, Carolina Steel & Wire Corp., Champion Road Machinery International Corp., Chem Service, Inc., Ciba-Geigy Corp., Cogsdill Tool Products, Inc., Defender Industries, Dennison Manufacturing Co., E.I. du Pont de Nemours & Company, Eaton Corporation, Ethyl Corporation, Faberge, General Electric Co., Georgetown Ferre Reduction, W.R. Grace & Co., Hoechst Celanese Corp., Inmont Corp., International Bio-Synthetics, Inc., 3M Corp., Mepco Centralab Co., Milliken & Co., Mobay Corp., Morton Thiokol, Inc., Risdon Enterprises, Inc., Sandoz Chemicals Corp., State Printing, J.P. Stevens & Co., Inc., Sun Refining and Marketing Co., Syntex Chemicals, Inc., Thermodisc, Inc., Thomasville Furniture Industries, Inc., Union Carbide Corp., Vermont American Corp., Westinghouse Electric Corp., Westvaco Corp., Winston Mills, Inc., York Tape & Label Company, (hereinafter called Respondents), pursuant to the authority vested in the President of the United States by Section 104, Section 106(a), and Section 122 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (hereinafter called CERCLA), 42 U.S.C. Section 9604, Section 9606(a), and Section 9622, as amended by the Superfund Amendments and Reauthorization Act of 1986 (hereinafter called SARA), P.L. 99-499. (CERCLA, as amended, may sometimes be hereinafter referred to simply as CERCLA.) SARA portions of the above-cited sections were delegated by the President to the Administrator of the EPA by Executive Order 12580, dated January 23, 1987, 52 Fed. Reg. 2923 (Jan. 29, 1987), and were redelegated by interim delegations of the Administrator of EPA to Regional Administrators and Assistant Administrators in EPA Delegations Nos. 14-8-B and 14-14-C, dated February 26, 1987. These interim delegations authorize Regional Administrators to enter into administrative orders by consent to perform Remedial

Investigations and Feasibility Studies (hereinafter called RI/FS).

Solely for the purposes of this Consent Order, the Respondents consent to and agree not to contest EPA jurisdiction to issue this Consent Order. Respondents consent to jurisdiction for purposes of entry and enforcement of this Consent Order by EPA, provided however, the Respondents do not admit, accept, concede, or acknowledge the determinations, allegations, findings of fact, and conclusions of law made by EPA in this Consent Order and specifically reserve the right to contest any such determinations, allegations, findings, and conclusions in any proceeding regarding the Bluff Road Site (hereafter called the "Site") other than actions brought by EPA to enforce this Consent Order. Furthermore, Respondents do not admit liability under CERCLA/SARA or any other statutory or common law and any responsibility for response costs or damages thereunder, and do not, by signing this Consent Order, waive any rights they may have to assert claims under CERCLA/SARA against any person, as defined in Section 101(21) of CERCLA, 42 U.S.C. Section 9601(21).

Respondents agree to undertake all actions required by the terms and conditions of this Consent Order, except as provided in Section VII.

II. STATEMENT OF PURPOSE

In entering into this Consent Order, the mutual objectives of EPA and Respondents are: (A) with respect to the Remedial Investigation, to determine fully the nature and extent of the threat to the public health or welfare or the environment caused by the release or threatened release of hazardous substances, pollutants, or contaminants from the Site into the environment; and (B) with respect to the Feasibility Study, to develop and evaluate alternatives for the appropriate extent of remedial action to prevent or mitigate the migration or the release or threatened release of hazardous substances, pollutants, or contaminants from the Site.

The activities conducted pursuant to this Consent Order will be consistent with the National Contingency Plan (NCP), 40 CFR Part 300, as amended, and will be subject to the express EPA approvals as set forth below.

III. FINDINGS OF FACT

For the purposes of this Consent Order, EPA finds that:

A. The Bluff Road Site (Site) is approximately a four acre site located about ten miles southeast of Columbia, South Carolina, in Richland County.

B. The Site was operated by South Carolina Recycling and Disposal, Inc. (SCRDI) from 1976-1982. Storage of drummed chemicals at the Site began in 1975. Prior to its use by SCRDI the Site was occupied by an acetylene manufacturer.

C. This Site was added to the National Priorities List, as defined in Section 105 of CERCLA, 42 U.S.C. Section 9605, in October 1981.

D. In 1982, the U.S. Department of Justice and the U.S. EPA entered into a partial settlement agreement with certain companies with respect to a surface cleanup at the Site. Pursuant to the terms of that partial settlement and to the provisions of CERCLA, the State of South Carolina commenced a remedial investigation of the Site.

E. Organic contaminants have been found in the soils and groundwater at the Site.

F. Soil samples collected and analyzed during previous investigations showed significant levels of phthalates, pesticides, benzene, phenols and other chemicals.

G. Groundwater samples collected in the spring of 1985 from wells on and off site were analyzed for volatile organic compounds. The following compounds were detected in the 100-1,000 part per billion (ppb) range:

- Benzene
- Ethylbenzene
- Carbon tetrachloride
- Chloroform
- 1,1 - Dichloroethylene
- Methylene chloride
- 1,1,2,2 - Tetrachlorethane
- Tetrachloroethylene
- Toluene
- 1,2 - Trans-dichloroethylene
- 1,1,1 - Trichloroethane
- 1,1,2 - Trichloroethane
- Trichloroethylene

The following compounds were detected in the 10-100 ppb range:

- Chlorobenzene
- 1,3 - Dichloropropene
- 1,2 - Dichloroethane
- Chlorodibromomethane

H. The contaminants on Site are uncontrolled and could prove to be a threat to public health or welfare and the

environment via the following pathways: groundwater (and drinking water supplies), air, surface water, sediments and direct contact.

IV. CONCLUSIONS OF LAW

For the purpose of this Consent Order, EPA concludes that:

A. The Site is a facility within the meaning of Section 101(9) of CERCLA, 42 U.S.C. Section 9601(9).

B. The Respondents are persons as defined in Section 101(21) of CERCLA, 42 U.S.C. Section 9601(21).

C. The chemicals found at the Site as described in Section III above are hazardous substances within the meaning of Section 101(14) of CERCLA, 42 U.S.C. Section 9601(14).

D. The hazardous substances described have been released into the environment and their potential migration pathways constitute both an actual release and threatened release within the meaning of Section 101(22) of CERCLA, 42 U.S.C. Section 9601(22).

V. DETERMINATIONS

Based on the Findings of Fact and Conclusions of Law set out above, EPA has determined that:

A. The actual and/or threatened release of hazardous substances from the Site may present an imminent and substantial endangerment to the public health or welfare or the environment.

B. The actions required by this Consent Order are necessary to protect the public health and/or welfare and/or the environment.

C. In accordance with Section 104(a)(1) of CERCLA, EPA has determined that the work to be performed pursuant to this Consent Order, if performed according to the terms of this Order, will be done properly and promptly by the Respondents. EPA has also determined that the Respondents are qualified to conduct such work.

VI. RESPONDENTS

A. Companies designated as "Performing Respondents" are listed on Appendix A, attached hereto and incorporated herein by reference. Performing Respondents shall be obligated to comply with all of the terms and conditions of this Consent Order.

B. Companies designated as "Non-Performing Respondents" are listed on Appendix B, attached hereto, and incorporated herein by reference. Non-Performing Respondents shall be obligated to comply with the following sections: I-VI, XIV, XV (except for obligations solely the responsibility of the performing respondents), and XVII-XXX.

VII. WORK TO BE PERFORMED

Based on the foregoing, it is hereby AGREED TO AND ORDERED that the following work shall be performed:

A. All work performed pursuant to this Consent Order shall be under the direction and supervision of a qualified professional engineer or a certified geologist with expertise in hazardous waste site cleanup. Prior to the initiation of the Site work, the Respondents shall notify EPA in writing regarding the identity of such engineer or geologist and of any contractors and/or subcontractors to be used in carrying out the terms of this Consent Order. Within 14 calendar days of notification EPA reserves the right to disapprove any engineer, geologist, contractor, and/or subcontractor selected for the RI/FS and shall specify the reason for such disapproval. In the event of such disapproval, Respondents shall notify EPA within 10 calendar days of an alternate selection.

B. Within thirty (30) calendar days of the effective date of this Consent Order, the Respondents shall submit to EPA a plan for the implementation of the RI/FS Work Plan provided by the Agency. This work plan shall be implemented in accordance with the EPA RI/FS guidance documents which have been provided to the Respondents by EPA (Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA), both dated October 1987, and with Section 121 of the Superfund Amendments and Reauthorization Act of 1986. As described in this guidance, the RI/FS Implementation Plan must include, at a minimum, a sampling plan and a schedule for deliverables and for completing the RI/FS. The RI/FS Implementation Plan and all other reports and plans shall be subject to review, modification and approval by EPA.

C. The Respondents shall implement the tasks detailed in the RI/FS Implementation Plan. Upon approval by EPA, the RI/FS Implementation Plan will be attached to and incorporated in this Consent Order along with the Work Plan and Project Plans developed by EPA. (Appendix C). This work shall be conducted in accordance with the EPA RI/FS guidance documents, and with the standards, specifications, and schedule contained in the RI/FS Work Plan and the RI/FS Implementation Plan.

D. Within seven (7) calendar days of approval of the RI/FS Implementation Plan by EPA, Respondents shall commence implementing the RI/FS Work Plan.

E. The Respondents shall provide monthly written progress reports to EPA according to the schedule contained in the RI/FS Implementation Plan. At a minimum, these progress reports shall: (1) describe the actions which have been taken toward achieving compliance with this Consent Order, (2) include all results of sampling and tests and all other data received by the Respondents, (3) include all plans and procedures completed subsequent to EPA approval of the RI/FS Implementation Plan during the past month, as well as such actions, data, and plans which are scheduled for the next month; and (4) identify anticipated delays or problem areas. These reports are to be submitted to EPA by the tenth (10th) day of each month following the date of EPA approval of the RI/FS Implementation Plan.

F. The Respondents shall provide preliminary and final reports to EPA according to the schedule contained in the RI/FS Implementation Plan.

G. EPA shall review the preliminary and final reports and within forty-five (45) calendar days after receipt by EPA of such reports, EPA shall notify the Respondents in writing of EPA's approval or disapproval of these reports or any part thereof. In the event of any disapproval, EPA shall specify in writing both the deficiencies and the reasons for such disapproval.

H. If in addressing the deficiencies, additional field or laboratory work is not required, then within thirty (30) calendar days after receipt of EPA notification of preliminary or final report disapproval, the Respondents shall amend and submit to EPA the revised reports. If field or laboratory work is required to correct the deficiencies, EPA and the Respondents shall agree on an appropriate amount of time for preparation of the report. In the event of subsequent disapproval, EPA retains the right to amend such reports, to enforce the terms of this Order, to perform additional studies,

and to conduct a complete RI/FS pursuant to its authority under CERCLA/SARA and to seek to recover costs associated with the above.

I. Documents, including reports, approvals, and other correspondence, to be submitted pursuant to this Consent Order, shall be sent by certified mail to the following addresses or to such other addresses as the EPA hereafter may designate in writing:

Documents (5 copies - 4 bound, 1 unbound) to be submitted to EPA should be sent to:

Michelle Glenn or
The Bluff Road Project Manager
EPA Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Documents to be submitted to the Respondents' Project Coordinator should be sent to:

Lorelei Joy Borland, Esq.	and	Michael Miller
Edwards & Angell		General Electric Company
430 Park Avenue		3135 Easton Turnpike
New York, New York 10022		Fairfield, Ct. 06431

Other notices and correspondence should be sent to:

Lorelei Joy Borland, Esq.	Vice President
Edwards & Angell	Corporate Environmental
430 Park Avenue	Program (TA)
New York, New York 10022	General Electric Company
	3135 Easton Turnpike
	Fairfield, CT. 06431

J. In addition to the EPA approved tasks and deliverables to be completed pursuant to this Consent Order, EPA may determine that tasks in addition to those set forth in the work plan (Appendix C), including remedial investigatory work and/or engineering evaluation, may be a necessary part of the RI/FS. Should EPA determine that such additional tasks are necessary, EPA shall notify Respondents. Upon written agreement of the parties hereto, this Consent Order may be modified as necessary to address such further investigation or study. Should Respondents not agree to the inclusion of these tasks, EPA retains the right to perform additional work as authorized by CERCLA and seek to recover its costs against any person. Respondents shall not be subject to stipulated penalties under this Consent Order for failure to perform tasks not included in the RI/FS Work Plan.

VIII. DESIGNATED PROJECT COORDINATORS

On or before the effective date of this Consent Order, EPA and Respondents will each designate a Project Coordinator. Each Project Coordinator will be responsible for overseeing the implementation of this Consent Order. The EPA Project Coordinator will be EPA's designated representative at the Site. To the maximum extent possible, communications between Respondents and EPA and all documents including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Consent Order, will be directed through the Project Coordinators.

EPA and Respondents each have the right to change their respective Project Coordinator. Such a change will be accomplished by notifying the other party in writing at least 5 calendar days prior to the change.

The EPA designated Project Coordinator will have the authority vested in a Remedial Project Manager by the National Contingency Plan, 40 CFR Part 300, as amended. This includes the authority to halt, conduct, or direct any tasks required by this Consent Order, or any response actions or portions thereof, when conditions present an immediate risk to public health or welfare or the environment.

The absence of the EPA Project Coordinator from the Site will not be cause for the stoppage of work.

IX. QUALITY ASSURANCE

Respondents will use quality assurance, quality control, and chain of custody procedures in accordance with EPA Region IV Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual (U.S. EPA Region IV, Environmental Services Division, April 1, 1986) throughout all sample collection and analysis. This manual will be provided to Respondents by EPA within 14 calendar days of the effective date of this Consent Order, if it has not previously been made available. Respondents will consult with EPA in planning for and prior to, all sampling analysis as detailed in the RI/FS Work Plan. In order to provide quality assurance and maintain quality control regarding all samples collected pursuant to this Consent Order, Respondents will:

A. Ensure that EPA personnel or EPA authorized representatives are allowed access to the laboratory(ies) and personnel utilized by Respondents for analyses.

B. Ensure that the laboratory(ies) utilized by Respondents for analysis perform(s) such analyses according to EPA methods or methods deemed satisfactory to EPA and submit(s) all protocols to be used for analyses to EPA at least 30 calendar days prior to the commencement of analysis.

C. Ensure that the laboratory(ies) utilized by Respondents for analyses participates in an EPA quality assurance/quality control program equivalent to that which is followed by EPA and which is consistent with EPA document AQMS-005/80. As part of such a program, and upon request by EPA, such laboratory will perform analysis of samples provided by EPA to demonstrate the quality of each laboratory's analytical data.

X. SITE ACCESS

To the extent that the Site or other properties necessary for the conduct of the RI/FS are presently owned by parties other than those bound by this Consent Order, Respondents have obtained or will use its best efforts to obtain on-site or off-site access agreements from the present owners of such properties within 30 calendar days of the effective date of this Consent Order. Such agreements shall provide reasonable access to EPA or its authorized representatives. In the event that site access agreements are not obtained within the time referenced above, Respondents shall notify EPA regarding both the lack of, and efforts to obtain, such agreements within 35 calendar days of the effective date of this Consent Order. In the event the Respondents are unable to obtain the necessary access agreements the EPA shall undertake to obtain necessary access, and Respondents shall reimburse EPA for the costs, including enforcement costs, incurred in obtaining such access.

XI. SAMPLING, ACCESS, AND DATA/DOCUMENT AVAILABILITY

A. Respondents will make the results of all sampling or tests or other data generated by Respondents, or on Respondents' behalf, with respect to the implementation of this Consent Order, available to EPA and will submit these results in monthly progress reports as described in Section VII of this Consent Order. EPA will make available to Respondents the results of sampling or tests or other data similarly generated by EPA. For good cause shown, EPA shall, to the extent possible, provide access to the raw data.

B. At the request of EPA, Respondents will allow split or duplicate samples to be taken by EPA or its authorized

representatives of any samples collected by Respondents pursuant to the implementation of this Consent Order. Respondents will notify EPA not less than 8 calendar days in advance of any sample collection activity.

C. EPA or any EPA authorized representative will have authority which includes, but is not limited to, authority to: enter and freely move about all property at the Site at all reasonable times in order to, inter alia: inspect records, operating logs, and contracts related to the implementation of this Consent Order; review the progress of Respondents in carrying out the terms of this Consent Order; conduct such tests as EPA or the EPA Project Coordinator deem necessary; use a camera, sound recording, or other documentary type equipment; and verify the data submitted to EPA by Respondents. Respondents will permit such person(s) to inspect and copy all records, files, photographs, documents, and other writings, including all sampling and monitoring data, in any way pertaining to work undertaken pursuant to this Consent Order. All parties with access to the Site pursuant to this paragraph will comply with all approved health and safety plans.

D. Respondents may assert a confidentiality claim, if appropriate, covering part or all of the information requested by this Consent Order pursuant to 40 CFR Section 2.203(b). Such an assertion will be adequately substantiated when the assertion is made. Analytical data will not be claimed as confidential by Respondents. Information determined to be confidential by EPA will be afforded the protection specified in 40 CFR Part 2, Subpart B. If no such claim accompanies the information when it is submitted to EPA, it may be made available to the public by EPA without further notice to Respondents.

XII. RECORD PRESERVATION

EPA and Respondents agree that each will preserve, during the pendency of this Consent Order and for a minimum of six (6) years after its termination, all records and documents in their possession or in the possession of their divisions, employees, agents, accountants, or contractors, which relate in any way to the implementation of the work plan, despite any document retention policy to the contrary. After this six-year period, each Respondent will notify EPA within 90 calendar days prior to the destruction of any such documents and such Respondent will make available to EPA such records or copies of such records with the exception of records which are attorney-work product or subject to the attorney-client privileges.

XIII. DISPUTE RESOLUTION

If Respondents object to any EPA notice of disapproval or decision made pursuant to this Consent Order, Respondents will notify EPA in writing of its objections within fourteen (14) days of receipt of the decision. EPA and Respondents then have an additional fourteen (14) calendar days from the receipt by EPA of the notification of objection to reach an agreement. If agreement cannot be reached on any issue within this fourteen (14) calendar day period, EPA will provide a written statement of this decision to Respondents and the reasons supporting that decision and rejecting the approach of the Respondents.

XIV. OVERSIGHT

In accordance with Section 104(a)(1) of CERCLA, as amended, 42 U.S.C. Section 9604(a)(1), Respondents agree to reimburse the Hazardous Substance Superfund for costs incurred by EPA or its authorized representatives in oversight of Respondents' performance of work under the Consent Order in an amount not to exceed \$150,000.00. Oversight costs shall not be included nor considered as part of the credit for the RI/FS costs as stated in Section XXIII.

At the end of each fiscal year, EPA will submit to Respondents a detailed accounting of all response and oversight costs incurred by the U.S. Government with respect to this Consent Order. Respondents will, within 30 calendar days of receipt of that accounting, remit a certified check for the amount of those costs made payable to the Hazardous Substance Superfund. Certified checks should specifically reference the identity of the Site and should be sent to:

U.S. Environmental Protection Agency
Superfund Accounting
P.O. Box 371003 M
Pittsburgh, PA 15251
Attention: Collection Officer for Superfund
CERCLIS NO. SCD000622787

A copy of the transmittal letter should be sent simultaneously to the Project Coordinator.

XV. DELAY IN PERFORMANCE/STIPULATED PENALTIES

Except for delays from events which constitute a force majeure, for each day during which Respondents fail to comply as set forth below, Respondents shall pay into the Hazardous Substance Superfund the sums set forth below as stipulated penalties.

A. For each day during which Respondents fail to perform in accordance with the time schedules for submittal of the following reports, documents, and payment of oversight costs:

1. Submittal and, if necessary, modification of the RI/FS Implementation Plan;

2. Submittal and, if necessary, modification of the preliminary and/or final Remedial Investigation ("RI") Report;

3. Submittal and, if necessary, modification of the preliminary and/or final Feasibility Study Report;

4. Submittal and, if necessary, modification of the Endangerment Assessment (Risk Assessment) and data required to be submitted to ATSDR, if applicable, for use in its Health Assessment;

5. Submittal and, if necessary, modification of any reports deemed to be critical path reports (i.e., geophysical report, incident reports, etc.);

6. Payment for oversight costs.

Respondents shall be liable to EPA for stipulated penalties in the following amounts:

<u>Period of Failure to Comply</u>	<u>Penalty Per Violation Per Day</u>
1st through 14th day	\$500.00
15th through 44th day	\$1,500.00
45th day and beyond	\$5,000.00

B. If Respondents fail to submit a monthly progress report within five (5) days after its due date, Respondents shall be liable to EPA for stipulated penalties in the amount of \$200.00 per violation for each day during which Respondents fail to submit and, if necessary, modify monthly progress reports.

C. Respondents shall be liable to EPA for stipulated penalties in the amount of \$200.00 per violation for each day during which they fail to comply with any implementation schedule, payment requirement, notification requirement or completion deadline.

Stipulated penalties begin to accrue on the day that a violation occurs or on the day following Respondents' failure to comply with any schedule or deadline, or the terms, conditions or requirements contained in this Consent Order

and/or Work Plan (Appendix C), and shall continue to accrue until Respondents' violation ends or until Respondents comply with the particular schedule, deadline, term, condition or requirement. Payment of stipulated penalties shall be due and owing within twenty (20) days from the date of receipt of a written notice from EPA notifying Respondents that penalties have been assessed.

Certified checks should specifically reference the Site and should be sent to:

U.S. Environmental Protection Agency
Superfund Accounting
P.O. Box 371003M
Pittsburgh, PA 15251
ATTENTION: Collection Officer for Superfund
CERCLIS NO: SCD000622787

A copy of the transmittal letter should be sent simultaneously to the EPA Project Coordinator.

The stipulated penalties set forth in this Section do not preclude EPA from electing to pursue any other remedies or sanctions which may be available to EPA by reason of Respondents' failure to comply with any of the requirements of this Consent Order. Such remedies and sanctions include, without limitation, a suit for statutory penalties as authorized by Section 106 of CERCLA, a federally-funded response action, and a suit for reimbursement of costs by the United States or the State of South Carolina.

XVI. FORCE MAJEURE

Any event beyond Respondents' control which causes delay in the achievement of the requirements of this Consent Order will be a force majeure event, and EPA will extend the time for performance hereunder by a period equal to the delay resulting from such circumstance or unless other circumstances warrant more time in the opinion of EPA. Respondents will have the burden of proving that the delay was caused by circumstances beyond the control of Respondents which could not have been overcome by due diligence. Respondents will promptly notify EPA's Project Coordinator orally within forty-eight (48) hours and will, within seven (7) calendar days of oral notification to EPA, notify EPA in writing of the anticipated length and cause of the delay, the measures taken or to be taken to prevent or minimize the delay, and the timetable by which Respondents intend to implement these measures. Respondents will diligently avoid or minimize delay. Failure of

Respondents to comply with the notice requirements of this paragraph constitutes a waiver of Respondents' right to request a waiver of any of the requirements of the Consent Order. Increased costs of performance of the terms of this Consent Order, failure to apply for permits and approvals, or changed economic circumstances will not be considered circumstances beyond the control of Respondents.

In the event that EPA and Respondents cannot agree that any delay in the achievement of the requirements of this Consent Order, including the failure to submit any report or document, has been or will be caused by a force majeure event, the dispute will be resolved in accordance with the provisions of the "Dispute Resolution" Section (Section XIII) of this Consent Order.

XVII. RESERVATION OF RIGHTS

EPA reserves the right to take any enforcement action pursuant to CERCLA or any other available legal authority, including the right to seek injunctive relief, monetary penalties, and punitive damages for any violation of law or this Consent Order.

Except as otherwise provided herein, EPA and Respondents expressly reserve all rights and defenses that they may have, including EPA's right both to disapprove of work performed by Respondents and to request that Respondents perform tasks in addition to those detailed in the RI/FS Work Plan, as provided in the Consent Order. In the event that Respondents decline to perform any additional or modified tasks, EPA will have the right to undertake any Remedial Investigation or Feasibility Study work. In addition, EPA reserves the right to undertake removal actions or remedial actions at any time. In either event, EPA reserves the right to seek reimbursement from Respondents thereafter for such costs which are incurred by the United States or the State of South Carolina.

In the event that EPA executes its right pursuant to Section VII(J), the Respondents reserve any and all rights and defenses they may have pursuant to CERCLA/SARA and any other statutory or common law.

The Respondents reserve the right to assert any applicable statutory rights relative to the remedy selected by the EPA for the Site. However, Respondents are precluded from and waive their rights, if any, to challenge the analytical data produced pursuant to the RI/FS Work Plan in any litigation with the United States.

XVIII. COVENANT NOT TO SUE

A. EPA shall covenant not to sue the Respondents for the following Covered Matters:

1. Conduct of the RI/FS in accordance with the RI/FS Work Plan and Site Implementation Plan, which shall take effect upon Certification of Completion of the RI/FS; and

2. Implementation of the Record of Decision, which shall take effect upon the date EPA issues its Certification of Completion of the remedy.

B. Nothing in this Consent Order will constitute or be construed as a covenant not to sue any person not a Signatory hereto from any claim, cause of action or demand in law or equity against any person, firm, partnership, or corporation for any liability it may have arising out of or relating in any way to the generation, storage, treatment, handling, transportation, release or disposal of any hazardous substances, hazardous wastes, pollutants, or contaminants found at, taken to, or taken from the Site.

C. The Respondents are not released for the following:

1. Claims based on a failure by the Respondents to comply with the requirements of this Administrative Order by Consent;

2. Liability arising from the past, present or future disposal, release or threat of release of hazardous substances outside of the Site and not attributable to the Site;

3. Liability for injury to natural resources;

4. Criminal liability.

D. Notwithstanding any other provisions of this Administrative Order by Consent, the EPA reserves the right to institute proceedings in this action, or to institute a new action (1) to compel the Respondents to finance or conduct additional response work at the Site, or (2) to reimburse the United States for response costs, if:

1. Conditions at the Site, previously unknown to the EPA, are discovered after the effective date of this Administrative Order by Consent; or

2. Information is received after the effective date of this Administrative Order by Consent which would impact the RI/FS or the Record of Decision, in whole or in part; and

3. Previously unknown conditions or new information indicates that the remedial action is not protective of human health and the environment.

XIX. OTHER APPLICABLE LAWS

All actions required to be taken pursuant to the Consent Order will be undertaken in accordance with the requirements of all applicable local, state and federal laws and regulations, unless an exemption from such requirements is specifically provided in this Consent Order, or made a part of this Consent Order by being incorporated herein at some later date.

XX. INDEMNIFICATION OF THE UNITED STATES GOVERNMENT

Respondents agree to indemnify and save and hold harmless the United States Government, its agencies, departments, agents, and employees, from any and all claims or causes of action arising from or on account of acts or omissions of Respondents, their officers, employees, receivers, trustees, agents or assigns, in carrying out the activities pursuant to this Consent Order. EPA is not a party in any contract involving Respondents at or relating to the Site.

XXI. LIABILITY OF RESPONDENTS

A. The Respondents shall be jointly and severally liable to EPA for one hundred (100%) percent of the RIFS costs and for 51.96% of remedial design and remedial action (RD/RA) costs, including operation and maintenance (O&M) costs and 51.96% of the ten percent (10%) share attributable to insolvent or bankrupt companies; provided however that if the Bankruptcy Court enters an order permitting Allis-Chalmers to participate and become a signatory to this Consent Order, Allis Chalmers shall be considered to be a Respondent. In that event, the Respondents shall be jointly and severally liable to EPA for one hundred (100%) percent of the RIFS costs and for 52.12% of remedial design and remedial action (RD/RA) costs, including operation and maintenance (O&M) costs and 52.12% of the ten percent (10%) share attributable to insolvent or bankrupt companies. Each Respondent agrees to pay its obligations under this Consent Order in accordance with its volumetric contribution to the site as defined in EPA's volumetric ranking list, Method III, attached hereto as Appendix D.

b. The percentage of the Respondents' liability for the RD/RA is fixed by paragraph XXI.A., herein. The Respondents shall pay their appropriate share of the RD/RA cost as determined in paragraph XXI and in accordance with Section XXII, Schedule of Payments.

XXII. SCHEDULE OF PAYMENTS

A. Within forty-five (45) days following the signing of the Record of Decision (ROD) by the EPA Region IV Administrator, Respondents shall establish an escrow account and deposit eighty-five (85%) percent of its share of the estimated costs of the remedy selected by EPA for the Site. Provided, however, that if Respondents' share exceeds \$5 million, payment shall be in two equal portions and deposited on or before the forty-fifth (45) day and the ninetieth (90) day following the signing of the Record of Decision or such later time as may be established by the EPA. Respondents' "share" shall be 51.96% percent (or 52.12% if Allis-Chalmers becomes a Respondent) (see Section XXI.A. above) of the estimated costs of the remedy, as specified in the ROD, minus the "credit" for the RI/FS costs as set forth in Section XXIII.

B. Within thirty (30) days following completion of the Remedial Design of the remedy selected for the Site, Respondents shall deposit ten (10%) percent of the remaining portion of their share of the estimated costs of the RD/RA into the escrow account.

C. Within thirty (30) days following completion of the Remedial Action at the Site, Respondents shall pay into the escrow account the remaining five (5%) percent of their share of any costs incurred by the EPA in implementing the RD/RA, adjusted for any amount which exceeds the estimated costs of the RD/RA or any amount which is lower than the estimated costs of the RD/RA.

D. The escrow account shall be established and maintained by the Performing Respondents. The monies deposited in the escrow account for work performed and to be performed within the next ninety (90) days shall be payable to the EPA Hazardous Substance Superfund within thirty (30) days of demand by the EPA.

E. Subsequent to certification of completion of the remedy, EPA shall provide, in accordance with applicable federal regulations, an accounting of the costs incurred by EPA in performance of the RD/RA.

XXIII. CREDIT FOR EXPENDITURES MADE PURSUANT TO THIS ORDER

A. Upon receipt of notice pursuant to Section XXX that Respondents have discharged their responsibilities pursuant to the Work Plan and under the provisions of this Consent Order, Respondents shall present EPA with a detailed accounting of (1) all costs incurred consistent with the NCP implementation of the Work Plan and in performance of the Work Plan, the RI/FS and the other activities required by this Consent Order; and (2) the amounts paid by each Respondent in connection therewith.

B. Subject to applicable regulations governing the audit of expenditures incurred by EPA pursuant to CERCLA, EPA will approve in writing all costs accounted for by Respondents which are consistent with subparagraph A (Approved Consent Order Costs). Upon such approval, EPA agrees to reduce the amount of response costs which it may seek from Respondents (credits) otherwise in connection with the Site by the amount such Respondents expended as an approved consent order cost.

C. The credit for RI/FS costs referred to in Subsections A and B above shall not include oversight costs nor stipulated penalties paid to EPA pursuant to this Order.

D. The Respondents shall not be liable to EPA for additional response costs including remedial design/remedial action costs, in excess of the amounts set forth in Section XXI less the reduction as provided in Subparagraph B hereof, subject to provisions of Section XVIII.D. of this Order.

E. In the event that the total response costs at the Site exceed the Respondents' liability as determined by subparagraphs A, B, and C, and Section XXI hereof, less the reduction as provided in subparagraph B, hereof, EPA, in the exercise of its prosecutorial discretion, reserves the right to and intends to seek any additional funds for such response costs from potentially responsible parties, including Respondents who have not contributed in accordance with their volumetric share to the funding of the RI/FS and RD/RA.

F. This agreement with EPA with respect to the Site shall affect only recovery of response costs from the Respondents and shall in no way affect the right of EPA to seek joint and several liability and recovery of all response costs from potentially responsible parties other than Respondents.

G. It is the intention and understanding of the parties to the Consent Order that the protection from contribution claims as provided by Section 113(f)(2) of CERCLA, as amended; applies to any claim with respect to Covered Matters as set forth in Section XVIII of this Order. The RD/RA contribution protection provided herein shall take effect with respect to each Respondent upon the date such Respondent complies with Section XXII(A) and shall remain effective as to such Respondent so long as such Respondent executes its responsibilities in accordance with this Consent Order.

XXIV. PUBLIC COMMENT

Upon submittal to EPA of an approved Feasibility Study Final Report, EPA will make both the Remedial Investigation Final Report and the Feasibility Study Final Report available to the public for review and comment for, at a minimum, a thirty (30) day period, pursuant to EPA's Community Relations Policy. Following the public review and comment period, EPA will execute a ROD which incorporates the remedial action alternative selected for the Site.

XXV. OTHER PROVISIONS

A. This Consent Order does not constitute a preauthorization of funds under Section 111(a)(2) of CERCLA, 42 U.S.C. 9611(a)(2).

B. In entering into this Consent Order, Respondents waive any right to seek reimbursement under Section 106(b)(2) of CERCLA, 42 U.S.C. Section 9606(b)(2), for any past costs associated with this Site, or any costs incurred in complying with this Order.

C. EPA agrees that said costs, other than stipulated penalties, shall not constitute a penalty or other monetary sanction paid by the Respondents.

XXVI. LIABILITY OF RESPONDENTS' RESPONSE ACTION CONTRACTOR

The Response Action Contractor, in connection with the activities set forth in the Approved Work Plan, shall not be liable under CERCLA or under any other federal law to the United States Government for costs or damages which result from a release or threatened release of hazardous substances or pollutants or contaminants provided that such releases or threatened release was not caused by the conduct of the Response Action Contractor which was negligent, grossly negligent, or which constituted intentional misconduct.

XXVII. EFFECTIVE DATE AND SUBSEQUENT MODIFICATION

In consideration of the communications between Respondents and EPA prior to the issuance of this Consent Order concerning its terms, Respondents agree that there is no need for a settlement conference prior to the effective date of this Consent Order. Therefore, the effective date of this Consent Order will be the date on which it is approved by the Deputy Attorney General

of the United States. This Consent Order may be amended by mutual agreement of EPA and Respondents. Such amendments will be in writing and will have, as the effective date, that date on which such amendments are signed by EPA.

Any reports, plans, specifications, schedules, and attachments required by this Consent Order are, upon approval by EPA, incorporated into this Consent Order.

No informal advice, guidance, suggestions, or comments by EPA regarding reports, plans, specifications, schedules, and any other writing submitted by Respondents will be construed as relieving Respondents of their obligation to obtain such formal approval of EPA as may be required by this Consent Order.

XXVIII. PARTIES BOUND

This Consent Order will apply to and be binding upon Respondents and EPA, their agents, successors, and assigns and upon all persons, contractors, and consultants acting under or for Respondents or EPA, or both.

No change in ownership or corporate or partnership status relating to the Site will in any way alter the status of Respondents or in any way alter Respondents' responsibilities under this Consent Order. Respondents will remain the Respondents under this Consent Order and will be responsible for carrying out all activities required of the Respondents under this Consent Order. Respondents will condition all contracts on compliance with this Consent Order. Respondents will provide a copy of this Consent Order to all successors in interest, contractors, subcontractors, laboratories, and consultants retained to conduct any portion of the work performed pursuant to this Consent Order within 14 calendar days of the effective date of this Consent Order or date of such retention, whichever is later.

XXIX. NOTICE

A. EPA has notified the State of South Carolina pursuant to the requirements of Section 106(a) of CERCLA.

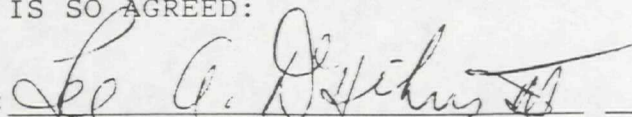
B. In the event EPA enters into a future settlement agreement regarding this Site, EPA shall provide written notice of such settlement to the Performing Respondents.

XXX. TERMINATION

The provisions of this Consent Order, other than Section XII (Record Preservation), Section XVII (Reservation of Rights), Section XVIII (Covenant Not To Sue), Section XXI (Liability Of Respondents), Section XXII (Schedule of Payments), and Section XXIII (Credit For Expenditures Made Pursuant To This Order), will be deemed fulfilled upon Respondents' receipt of written notice from EPA that Respondents have demonstrated to the satisfaction of EPA, that all of the terms of this Consent Order have been completed.

IT IS SO AGREED:

BY:



U.S. Environmental Protection Agency

MAR 01 1988

Date

IT IS SO AGREED:

BY:

See Attached Signature Sheets
(For the Respondents) Title

Date



10 11 0027

U.S. Department of Justice
Land and Natural Resources Division


Office of the Assistant Attorney General

Washington, D.C. 20530

APR 20 1988

MEMORANDUM

TO: Arnold I. Burns
Deputy Attorney General

FROM: Roger J. Marzulla 
Assistant Attorney General

SUBJECT: Request for Approval of Compromise of
Potential Government Claims under EPA
Administrative Order by Consent

SUMMARY

This memorandum recommends your approval of the attached proposed Environmental Protection Agency (EPA) Administrative Order by Consent under which a large number of Respondents commit to perform a Remedial Investigation and Feasibility Study and to fund 51.96% of the cleanup costs at a former hazardous waste facility. In exchange, the government would covenant not to sue the settlers for the RI/FS and remedial cleanup costs and would provide contribution protection under Section 113 of the Comprehensive Environmental Response, Compensation and Liability Act as amended, 42 U.S.C. § 9613 as to the remaining remedial cleanup costs.

While the proposed Order is a very favorable settlement of the government's claims, it represents a significant compromise of potential government claims in an amount beyond my authority under 28 C.F.R. § 0.160(a)(1). Therefore, I am referring the matter to you with my recommendation for your approval.


10 11 0028

- 2 -

RECOMMENDATION

Our client agency, EPA, has requested the approval of the Department of Justice in this matter. I recommend that you approve the attached proposed EPA Administrative Order by Consent and the underlying compromise of potential government claims.

(☒) APPROVED
(☐) DISAPPROVED



ARNOLD I. BURNS
Deputy Attorney General

Date

4/21/88

XXX. TERMINATION

~~The provisions of this Consent Order, other than Section XII (Record Preservation), and Section XXII (Schedule of Payments), will be deemed fulfilled upon Respondents' receipt of written notice from EPA that Respondents have demonstrated, to the satisfaction of EPA, that all of the terms of this Consent Order, including any additional tasks which EPA has determined to be necessary, have been completed.~~

IT IS SO AGREED:

BY: Daniel E. Quinn - Director Corporate Environmental Control February 4, 1988
(For the Respondents) Title Date

ABBOTT LABORATORIES

IT IS SO AGREED:

BY: _____
U.S. Environmental Protection Agency Date: _____

10 11 0030

IT IS SO AGREED:

ALBANY INTERNATIONAL Corp.

BY: Raymond D. Dupresne - Treasurer
(For the Respondents) Title

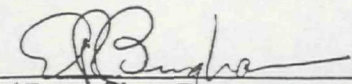
2/1/68

Date

10 11 0031

IT IS SO AGREED:

BY:



(For the Respondents) Title
Senior Vice President
E.R. Bingham
AMAX Mineral Resources Company
A Division of AMAX, Inc.

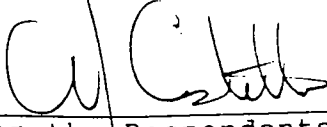
February 17, 1988

Date

10 11 0032

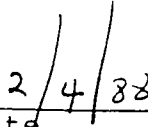
IT IS SO AGREED:

BY:



(For the Respondents) Title

Executive Vice President
American Cyanamid Company



Date 2/4/88

10 11 0033

IT IS SO AGREED:

FOR: AT&T TECHNOLOGIES, INC.

BY:

David R. Chittick
(For the Respondents) Title

February 3, 1988
Date

DAVID R. CHITTICK
ENGINEERING VICE PRESIDENT
AMERICAN TELEPHONE & TELEGRAPH COMPANY

10 11 0034

IT IS SO AGREED:

Borden Chemical, Division of Borden Inc.

BY: 

(For the Respondents) Title

W. Bailey Barton, Vice President
Environmental Affairs Dept.

February 4, 1988

Date

10 11 0035

IT IS SO AGREED:

BY: Sam C Bailey, Attorney
 Carolina Eastman Company
 (For the Respondents) Title

2/11/88

Date

10 11 0036

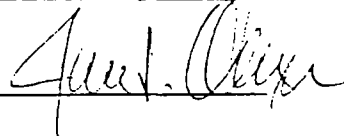
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV

IN THE MATTER OF:	)	Proceeding Under Section 104,
	)	Section 106(a) and Section 122
BLUFF ROAD SITE	)	of the Comprehensive Environ-
	)	mental Response Compensation,
Hoechst Celanese Corporation,	)	and Liability Act of 1980, as
General Electric Company,	)	amended, 42 U.S.C. Section 9604,
Union Carbide Corporation,	)	Section 9606(a), and Section
AT & T Technologies, Inc.,	)	9622.
<u>et al.</u> ,)	
)	
Respondents	)	EPA DOCKET NO:

By the following signature, Carolina Steel & Wire Corporation
acknowledges its agreement to be bound by the Consent Order in the
above-styled action:

Company: Carolina Steel and Wire Corporation

Individual: Jack S. Alexander



Title: President

Date: February 16, 1988

10 11 0037

IT IS SO AGREED:

BY: Lillian C. Cate Employee Relations 2/8/88
(For the Respondents) Title mgr. Date

Champion Road Machinery Internatl. Corp.

-21-

EB- 5-88 SAT 16:10 EDWARDS & ANGELL

P. 21

2/3/88

10 11 0038

IT IS SO AGREED:

Chem Service, Inc., As a Non-Performing Respondent

BY: E. Hollenbach Pres.
(For the Respondents) Title

February 3, 1988
Date

E. Hollenbach, President

10 11 0039

IN THE MATTER OF:

BLUFF ROAD SITE

IT IS SO AGREED:

BY: 

(For the Respondents) Title

Joseph T. Sullivan

Senior Vice-President

CIBA-GEIGY Corporation

February 4, 1988

Date

10 11 0040

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV

IN THE MATTER OF:	)	Proceeding Under Section 104,
	)	Section 106(a) and Section 122
BLUFF ROAD SITE	)	of the Comprehensive Environ-
	)	mental Response Compensation,
Hoechst Celanese Corporation,	)	and Liability Act of 1980, as
General Electric Company,	)	amended, 42 U.S.C. Section 9604,
Union Carbide Corporation,	)	Section 9606(a), and Section
AT & T Technologies, Inc.,	)	9622.
<u>et al.</u> ,)	
)	
Respondents	)	EPA DOCKET NO:

By the following signature, Cogsdill Tool Products, Inc.
acknowledges its agreement to be bound by the Consent Order in
the above-styled action:

Company: COGSDILL TOOL PRODUCTS INC.

Individual: John C. Schuch

Title: U.P. FINANCE

Date: 2/16/88

10 11 0041

IT IS SO AGREED:

BY: R. D. Shunk Exec. V.P.
(For the Respondents) Title.
Defender Industries

2-5-88

Date

10 11 0042

IT IS SO AGREED:

BY: Kathleen Michael O'Donohue 12 Feb 1988
(For the Respondents) Title Date

Dennison Manufacturing Company

10 11 0043

IT IS SO AGREED:

By: _____

JW Keiter
J. W. Keiter
Senior Counsel
E. I. du Pont de Nemours and Company

2/4/88
Date

XXX. TERMINATION

~~The provisions of this Consent Order, other than Section XII (Record Preservation), and Section XXII (Schedule of Payments), will be deemed fulfilled upon Respondents' receipt of written notice from EPA that Respondents have demonstrated, to the satisfaction of EPA, that all of the terms of this Consent Order, including any additional tasks which EPA has determined to be necessary, have been completed.~~

IT IS SO AGREED:

BY: Eaton Corp. - D. E. McIntire - Gen. Mgr.
(For the Respondents) Title

February 3, 1988

Date

IT IS SO AGREED:

BY: U.S. Environmental Protection Agency

Date:

10 11 0045

IT IS SO AGREED:
ETHYL CORPORATION

BY: W. T. Davis
(For the Respondents) Title
W. T. Davis, General Manager
Special Chemicals Division

February 4, 1988
Date

10 11 0046

IT IS SO AGREED: *FABERGE INC*

BY:

Jacob Holland VP
(For the Respondents) Title

2/4/08
Date

10 11 0047

IT IS SO AGREED:

General Electric Company.

BY:

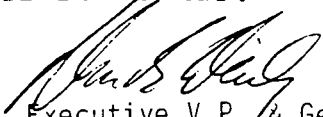
Thomas N. Chasnovy
(For the Respondents) Title

2-3-88
Date

Counsel Remedial Projects

10 11 0048

IT IS SO AGREED:

BY: 
Executive V.P. & General Manager
(For the Respondents) Title

Georgetown Ferre Reduction

02-05-88

Date

10 11 0049

IT IS SO AGREED:

BY: *Robert C. White*
(For the Respondents) Title
Vice President, W.R. Grace & Co.

February 3, 1988
Date

IT IS SO AGREED:

BY: Robert A. Longman
(For the Respondents) Title
Vice President

February 11, 1988
Date

Robert A. Longman
Vice President & General Counsel
Hoechst Celanese Corporation

IN THE MATTER OF BLUFF ROAD SITE:
ADMINISTRATIVE ORDER BY CONSENT

10 11 0051

IT IS SO AGREED:

Inmont Corp.

BY:

T. H. H. Van der Horst, Jr.
(For the Respondents) Title

*Counsel for Inmont
Corp*

4 Feb 1988

Date

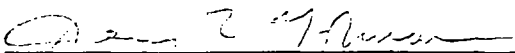
10 11 0052

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV

IN THE MATTER OF:	)	Proceeding Under Section 104,
	)	Section 106(a) and Section 122
BLUFF ROAD SITE	)	of the Comprehensive Environ-
	)	mental Response Compensation,
Hoechst Celanese Corporation,	)	and Liability Act of 1980, as
General Electric Company,	)	amended, 42 U.S.C. Section 9604,
Union Carbide Corporation,	)	Section 9606(a), and Section
AT & T Technologies, Inc.,	)	9622.
<u>et al.</u> ,)	
)	
Respondents	)	EPA DOCKET NO:

By the following signature, International Bio-Synthetics, Inc. (previously Gist Brocades USA or G-B Fermentation, Inc.), acknowledges its agreement to be bound by the Consent Order in the above-styled action:

Company: International Bio-Synthetics Inc.

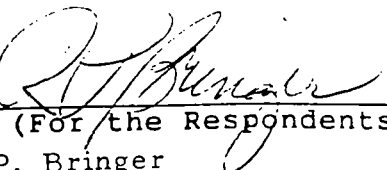
Individual: 
Jerry L. Norman

Title: Director, Government & Industry Affairs

Date: February 16, 1988

IT IS SO AGREED:

BY:



(For the Respondents) Title

R. P. Bringer

Staff Vice President, Environmental
Engineering and Pollution Control

Minnesota Mining and Manufacturing Company

February 5, 1988

Date

10 11 0054

IT IS SO AGREED:

BY: Ad Cundey, Treasurer
(For the Respondents) Title
Mepco Centralab Company
(Formerly Mepco/Electra, Inc.)

February 3, 1988
Date

IT IS SO AGREED:

BY: *H. William Petty*
(For the Respondents) Title
Vice President & General Counsel
Milliken & Company

2-4-88

Date

XXX. TERMINATION

~~The provisions of this Consent Order, other than Section XII (Record Preservation), and Section XXII (Schedule of Payments), will be deemed fulfilled upon Respondents' receipt of written notice from EPA that Respondents have demonstrated, to the satisfaction of EPA, that all of the terms of this Consent Order, including any additional tasks which EPA has determined to be necessary, have been completed.~~

IT IS SO AGREED:

MOBAY CORPORATION

By *hul*Name H. R. WernerTitle Vice PresidentFebruary 3, 1988

Date


IT IS SO AGREED:

By U.S. Environmental Protection Agency
Date

10 11 0057

IT IS SO AGREED:

BY:


(For ~~the~~ Respondents) Title

Morton Thiokol, Inc.
Vice President for Legal Affairs
and General Counsel

February 3, 1988

Date

10 11 0058

IT IS SO AGREED:
RISDON ENTERPRISES, INC.

BY Robert L. Barkin Vice President
(For the Respondents) Title

February 4, 1988
Date

10 11 0059

IT IS SO AGREED:

SANDOZ CHEMICALS CORPORATION

BY: 

(For the Respondents) Title

K. L. Brewton, Jr., President & CEO



February 5, 1988

Date

10 11 0060

IT IS SO AGREED:

State Printing Company

BY: X Kenneth Turner, VP.
(For the Respondents) Title

March 7, 1988
Date

Kenneth Turner, Vice President
Non Performing Respondent
PO Box 1388, Cola., Sc 29202
Telephone: 803-799-9550
Telecopy: 803-799-9550, Ext 224

Attorney:

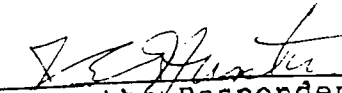
Reece Williams
Robinson, McFadden, Moore, Pope
Williams, Taylor & Brailsford, PA
Six Hundred Jefferson Square
PO Box 944
Columbia, SC 29202
Telephone: 803-779-8900

10 11 0061

BLUFF ROAD ADMINISTRATIVE ORDER BY CONSENT OF 2-9-88.

IT IS SO AGREED:

BY:



(For the Respondents) Title

J. E. Hunter

Vice President, Technical Services

J.P. Stevens & Co., Inc.

February 9, 1988

Date

10 11 0062

ADMINISTRATIVE ORDER BY CONSENT (BLUFF ROAD SITE)

IT IS SO AGREED: Sheldon L. Thompson, Director, Applied Research and Development Department, Sun Refining and Marketing Company, as a non-performing respondent

BY Sheldon L. Thompson
(For the Respondents) Title

2/3/88
Date

10 11 0063

Administrative Order By Consent

IT IS SO AGREED:

BY: *Robert H. Ellis*
(For Syntex Chemicals, Inc.
formerly Arapahoe Chemicals)

12 FEB 1988
(DATE)

TITLE: PRESIDENT

10 11 0064

IT IS SO AGREED:

BY: *Louise E. Hall*
(For the Respondents) Title

Thermodisc, Inc.

2/8/88
Date

10 11 0065

IT IS SO AGREED:

BY: Charles H. O'Brien
(For the Respondents) Title

Executive Vice President

2/4/98
Date

NON-PERFORMING RESPONDENT
THOMASVILLE FURNITURE INDUSTRIES, INC.

10 11 0066

IT IS SO AGREED:

LH/B
287 BY: 

(For the Respondents) Title
John R. Maclean
President, Industrial Gases
Union Carbide Corporation

2/4/88

Date

10 11 0067

-19-

XXX. TERMINATION

~~The provisions of this Consent Order, other than Section XII (Record Preservation), and Section XXII (Schedule of Payments), will be deemed fulfilled upon Respondents' receipt of written notice from EPA that Respondents have demonstrated, to the satisfaction of EPA, that all of the terms of this Consent Order, including any additional tasks which EPA has determined to be necessary, have been completed.~~

IT IS SO AGREED:

BY: Vermont American Corporation
Julio P. Hagan, Asst. Secretary
(For the Respondents) Title
Vermont American Corp.

February 4, 1988.
Date

IT IS SO AGREED:

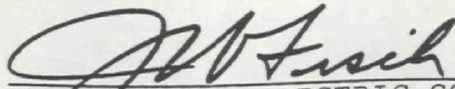
BY: U.S. Environmental Protection Agency

Date:

10 11 0068

IT IS SO AGREED:

BY:



WESTINGHOUSE ELECTRIC CORPORATION

J. W. Fisch

Manager, Environmental Remediation &
Industrial Hygiene & Safety

DATE: FEBRUARY 4, 1988

No change in ownership or corporate or partnership status relating to the Site will in any way alter the status of Respondents or in any way alter Respondents' responsibilities under this Consent Order. Respondents will remain the Respondents under this Consent Order and will be responsible for carrying out all activities required of the Respondents under this Consent Order. Respondents will condition all contracts on compliance with this Consent Order. Respondents will provide a copy of this Consent Order to all successors in interest, contractors, subcontractors, laboratories, and consultants retained to conduct any portion of the work performed pursuant to this Consent Order within 14 calendar days of the effective date of this Consent Order or date of such retention, whichever is later.

XXIX. NOTICE

A. EPA has notified the State of South Carolina pursuant to the requirements of Section 106(a) of CERCLA.

B. In the event EPA enters into a future settlement agreement regarding this Site, EPA shall provide written notice of such settlement to the Performing Respondents.

XXX. TERMINATION

The provisions of this Consent Order, other than Section XII (Record Preservation), Section XVIII (Covenant Not To Sue), Section XXI (Liability Of Respondents), Section XXII (Schedule of Payments), and Section XXIII (Credit For Expenditures Made Pursuant To This Order), will be deemed fulfilled upon Respondents' receipt of written notice from EPA that Respondents have demonstrated to the satisfaction of EPA, that all of the terms of this Consent Order have been completed.

IT IS SO AGREED:

BY: _____
U.S. Environmental Protection Agency Date

BY: Thomas A. Long 2/4/88
(For the Respondents) Title Date

Western Corporation
Senior Vice President and General Counsel

10 11 0070

IT IS SO AGREED: *Winston Mills doc*

BY: *Jacob H. Bonds VP*
(For the Respondents) Title

2/4/88
Date

10 11 0071

IT IS SO AGREED:

BY:

Paul H. Gangle President
(For the Respondents) Title
as a non-participating member

2/3/68

Date

York Tape and Label

10 11 0072

IT IS SO AGREED, subject to approval by the U.S. Bankruptcy Court, Southern District of New York:

Allis-Chalmers Corporation, Debtor in Possession

BY: *Ronald J. Burns*
(For the Respondents) Title

February 9, 1988

Date

Ronald J. Burns
Senior Vice President

10 11 0073

0 2 6 7 f

APPENDIX A

PERFORMING RESPONDENTS

- 1) AMERICAN CYANAMID CO.
- 2) AT & T TECHNOLOGIES, INC.
- 3) CIBA-GEIGY CORP.
- 4) EATON CORP.
- 5) ETHYL CORP.
- 6) GENERAL ELECTRIC CO.
- 7) HOECHST CELANESE CORP.
- 8) INMONT CORP.
- 9) MORTON THIOKOL, INC.
- 10) J.P. STEVENS & CO., INC.
- 11) UNION CARBIDE CORP.

10 11 0074

0 2 6 6 5

APPENDIX B

NONPERFORMING RESPONDENTS

- 1) ABBOTT LABORATORIES
- 2) ALBANY INTERNATIONAL CORP.
- 3) AMAX MINERAL RESOURCES CO.
- 4) BORDEN, INC.
- 5) CAROLINA EASTMAN CORP.
- 6) CAROLINA STEEL & WIRE CORP.
- 7) CHAMPION ROAD MACHINERY INTERNATIONAL CORP.
- 8) CHEM SERVICE, INC.
- 9) COGSDILL TOOL PRODUCTS, INC.
- 10) DEFENDER INDUSTRIES
- 11) DENNISON MANUFACTURING CO.
- 12) E.I. DU PONT DE NEMOURS & CO.
- 13) FABERGE
- 14) GEORGETOWN FEREDUCTION
- 15) W.R. GRACE & CO. (Cryovac)

10 11 0075

- 17) INTERNATIONAL BIO-SYNTHETICS, INC.
(formerly G.B. Fermentation or Gist Brocades)
- 18) 3M CORP.
- 19) MEPCO CENTRALAB CO.
- 20) MILLIKEN & CO.
- 21) MOBAY CORP.
- 22) RISDON ENTERPRISES, INC.
- 23) SANDOZ CHEMCIALS CORP.
- 24) STATE PRINTING
- 25) SUN REFINING & MARKETING CO.
- 26) SYNTEX CHEMICALS, INC.
- 27) THERMODISC, INC.
- 28) THOMASVILLE FURNITURE INDUSTRIES, INC.
- 29) VERMONT AMERICAN CORP.
- 30) WESTINGHOUSE ELECTRIC CORP.
- 31) WESTVACO CORP.
- 32) WINSTON MILLS, INC.
- 33) YORK TAPE & LABEL CO.

10 11 0076

BLUFF ROAD SITE - SOUTH CAROLINA

RANKED ACCORDING TO METHOD 111

ANK	GENERATOR	TOTAL VOLUME (DRUMS)	PERCENT (OF TOTAL)	PERCENTILE
1	ALLIED CHEMICAL	2,638.00	11.18	90.0000
2	AMERICAN CYANAMID	1,652.45	7.00	85.0000
3	ED SERVICES INC.	1,488.15	6.31	80.0000
4	STERN ELECTRIC	1,339.55	5.68	70.0000
5	CIBA GEIGY CORP.	1,095.64	4.64	
6	GENERAL ELECTRIC	1,072.73	4.55	65.0000
7	MC/B (MAIHESON, COLEMAN & HEIL)	1,038.18	4.40	60.0000
8	ROBINS A.F.B.	962.00	4.06	55.0000
9	COLUMBIA ORGANIC CHEMICAL CO.	881.36	3.74	50.0000
10	INMONT CORP.	834.00	3.54	45.0000
11	CELANESE FIBER CO.	783.09	3.32	
12	DELAWARE CONTAINER	747.02	3.17	40.0000
13	UNION CARBIDE CO.	660.27	2.80	
14	WESTINGHOUSE ELECTRIC CORP.	644.82	2.73	35.0000
15	SUNTECH, INC.	635.91	2.70	
16	ARAPAHOE CHEMICAL	616.06	2.61	30.0000
17	EATON CORP.	406.82	1.72	
18	TECH-O-DISC, INC.	385.00	1.63	25.0000
19	AGU-AIR CORP.	377.09	1.60	

10 11 0077

RANKED ACCORDING TO METHOD 111

RANK	GENERATOR	TOTAL VOLUME (DRUMS)	PERCENT (OF TOTAL)	PERCENTILE
20	U.S. E.P.A	302.38	1.26	
21	MILLIKEN RESEARCH CORP.	296.73	1.21	
22	VERNER CHEMICAL CO.	296.54	1.26	20.0000
23	MONSANTO	286.55	1.21	
24	YOUNG REFINING CORP.	278.00	1.16	
25	HARDWICKE CHEMICAL/ EMERY INDUSTRIES	262.31	1.11	
26	VENTRON CORP.	217.18	.92	15.0000
27	KINGS LABORATORIES	207.82	.88	
28	FIKE CHEMICAL	168.00	.71	
29	ALBANY INT'L (ONCE CHEMICAL SAMPLE CO.)	160.73	.66	
30	J.P. STEVENS & CO.	160.00	.66	
31	UNIVERSITY OF GEORGIA	142.00	.60	
32	TEEPAN INC.	135.00	.57	
33	GEORGIA INSTITUTE OF TECHNOLOGY	127.73	.54	10.0000
34	BARKER INDUSTRIES	110.23	.47	
35	TEXTILE CHEMICAL CO.	100.00	.42	
36	GRUCE LABORATORIES	95.00	.40	
37	ANAA CORP. (ANAA ANAA SPECIALTY METALS)	92.00	.39	
38	ABEOTI LABORATORIES	91.00	.39	

10 11 0078

RANKED ACCORDING TO METHOD III

RANK	GENERATOR	TOTAL VOLUME (DRUGS)	PERCENT (OF TOTAL)	PERCENTILE ,
39	CHARLESTON AIR FORCE BASE	84.00	.36	
40	MEPCO/ELECTRA INC.	83.28	.35	
41	WEST VIRGINIA UNIVERSITY	80.73	.34	
42	STATE PRINTING CO.	80.00	.34	
43	VERMONT AMERICAN CORP.	80.00	.34	
44	FABERGE, INC.	79.73	.34	
45	3 M COMPANY	76.32	.32	
46	THOMASVILLE FURNITURE INDUSTRIES INC.	75.00	.32	5.0000
47	BEAUFORT CHEMICAL & RESEARCH CO., INC.	74.39	.32	
48	PYRAMID CHEMICAL SALES CO.	65.00	.28	
49	CENTER FOR DISEASE CONTROL (CDC)	60.00	.25	
50	E.I. DUPONT DE NEMOURS & CO.	59.75	.25	
51	ACETO CHEMICAL CO. (AKA PFALTZ & BAUER)	58.13	.25	
52	U.S. NUCLEAR INC.	40.00	.17	
53	AMERICAN RECOVERY CO., INC.	39.45	.17	
54	CHAMPION ROAD MACHINERY	39.00	.17	
55	ALLIS-CHALMERS	38.09	.16	
56	DENNISON MANUFACTURING CO.	36.00	.16	
57	UNIVERSITY OF SOUTH CAROLINA	37.09	.16	

10 11 0079

RANKED ACCORDING TO METHOD III

NK	GENERATOR	TOTAL VOLUME (DRUMS)	PERCENT (OF TOTAL)	PERCENTILE
8	CAROLINA STEEL & PIPE CORP.	32.00	.14	
9	BORDEN CHEMICAL CORP.	31.55	.13	
10	ATRONICS	28.00	.12	
11	STORK INTERNATIONAL	26.00	.12	
12	FORT BRAGG	23.00	.10	
13	DEFENDER INDUSTRIES	21.00	.09	
14	WINSTON MILLS	21.00	.09	
15	BORDEN CHEMICAL COMPANY	20.00	.08	
16	COGSDILL TOOL CO.	20.00	.08	
17	WESTVACO	20.00	.08	
18	SANDOZ COLOR & CHEMICALS	17.00	.07	
19	SCIENTIFIC SERVICES	16.43	.07	
20	TRAVENOL LABS	16.00	.07	
21	YORK TAPE & LABEL CORP.	16.00	.07	
22	FLEXOPLATE DIVISION, TRANTOR INC.	15.00	.06	
23	BLAZER BOAT CO. (CUSTOM FIBERGLASS)	14.00	.06	
24	SCRDI, SHOP ROAD WAREHOUSE	14.00	.06	
25	KEMSTAR CORP.	13.00	.06	
26	LIGHT AND BELLWORTH CO.	12.00	.05	

10 11 0080

RANKED ACCORDING TO METHOD 111

RANK	GENERATOR	TOTAL VOLUME (DRUMS)	PERCENT (OF TOTAL)	PERCENTILE
77	UNIVERSITY OF LOUISVILLE	12.00	.05	
78	STON INDUSTRIES	11.56	.05	
79	EVES BROTHERS, INC.	11.00	.05	
80	ARMEGEDDON CHEMICAL CO.	10.00	.04	
81	CAROLINA EASTMAN	10.00	.04	
82	GEORGETOWN FERRDUCTION	10.00	.04	
83	STATEWIDE WASTE OIL & CHEMICALS	9.09	.04	
84	SOUTHERN ENGINEERING CO.	9.00	.04	
85	SUGGS SALES	9.00	.04	
86	WILMAR INC.	8.23	.03	
87	CATIONICS, INC.	8.00	.03	
88	CHEM SERVICE INC.	8.00	.03	
89	STRIP SHOP INC.	8.00	.03	
90	UNIVERSITY OF NORTH CAROLINA	7.18	.03	
91	G.B. FERMENTATION INDUSTRIES	7.00	.03	
92	HELM'S BOAT WORKS	7.00	.03	
93	MEDICAL UNIVERSITY OF SOUTH CAROLINA	7.00	.03	
94	BRINCETOWN CHEMICAL RESEARCH CO.	7.00	.03	
95	BYNCO	6.00	.03	

10 11 0081

RANKED ACCORDING TO METHOD 111

RANK	GENERATOR	TOTAL VOLUME (DRUMS)	PERCENT (OF TOTAL)	PERCENTILE
96	AUTOMATION INDUSTRIES	6.00	.03	
97	GEORGIA STATE UNIVERSITY	6.00	.03	
98	EXPERIMENTAL PATHOLOGY LABS INC.	5.69	.02	
99	OBION WEST	5.00	.02	
100	CAROLINA BIOCHEMICAL	5.00	.02	
101	RECCO TAPE AND LABEL	5.00	.02	
102	MARSHALL UNIVERSITY	4.00	.02	
103	VERONA DYES/STUFF DIV. (MUBAY CHEM. CORP.)	4.00	.02	
104	GEORGE DIETER	3.82	.02	
105	THERMAL ENGINEERING CORP.	3.52	.01	
106	VEGA CHEMICAL CO.	3.00	.01	
107	METAL PLATING CO.	2.09	.01	
108	UNIVERSAL BIOLOGICAL AND CHEMICAL CO.	2.05	.01	
109	CAMDEN RECYCLE CENTER	2.00	.01	
110	MAGLA PRODUCTS	1.64	.01	
111	ST. JOSEPH'S HOSPITAL	1.55	.01	
112	STEIN, HALL & CO., INC.	1.25	.01	
113	PRESBYTERIAN COLLEGE	1.04	.00	
114	COLUMBIA CHRYSLER PLYMOUTH	1.00	.00	

10 11 0082

RANKED ACCORDING TO METHOD III

RANK	GENERATOR	TOTAL VOLUME (DRUMS)	PERCENT (OF TOTAL)	PERCENTILE
115	CRYOVAC (DIV. OF W.R. GRACE & CO.)	1.00	.00	
116	IRMAN UNIVERSITY	1.00	.00	
117	NORTH CAROLINA STATE UNIVERSITY	1.00	.00	
118	RICHLAND MEMORIAL HOSPITAL	1.00	.00	
119	WENTWORTH PRINTING	1.00	.00	
120	SAUSVILLE CHEMICAL CO.	.52	.00	
121	U.S. A.F.A.C.F.S.	.11	.00	
122	COLONIAL RUBBER	.04	.00	
123	ETHYL CORP.	.04	.00	
124	STANALYNE	.02	.00	
125	EISENHOWER MEDICAL CENTER	.01	.00	.0000
126	ACE CHEMICAL CORP.	.00	.00	
127	ACKERMAN ENTERPRISES	.00	.00	
128	ALDRICH CHEMICAL CO.	.00	.00	
129	ALMEDA ENTERPRISES, INC.	.00	.00	
130	ALTAIR CO.	.00	.00	
131	ALTERNATE ENERGY RESOURCES	.00	.00	
132	AMERICAN COLOR & CHEMICAL CORP.	.00	.00	
133	ANALYTICAL CHEMICALS AND REAGENTS	.00	.00	

10 11 0083

EPA WORK ASSIGNMENT NUMBER 189-4L15
UNDER
CONTRACT NUMBER 68-01-7250



RI/FS WORK PLAN
BLUFF ROAD SITE
RICHLAND COUNTY, SOUTH CAROLINA

MARCH 1988

NOTICE

The information in this document has been funded by the United States Environmental Protection Agency (U.S. EPA) under REM III - Contract No. 68-01-7250 to Ebasco Services Incorporated (EBASCO). This document has not been formally released by either EBASCO or the U.S. EPA.

10 11 0084


EPA WORK ASSIGNMENT NUMBER 189-4L15
UNDER
CONTRACT NUMBER 68-01-7250

RI/FS WORK PLAN
BLUFF ROAD SITE
RICHLAND COUNTY, SOUTH CAROLINA

MARCH 1988

PREPARED BY:

APPROVED BY:


TIMOTHY J. WOLTERINK, PG
SITE MANAGER
EBASCO SERVICES INCORPORATED

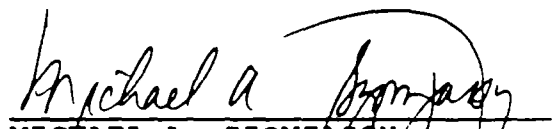

MICHAEL A. SZOMJASSY
REGIONAL MANAGER, REGION IV
EBASCO SERVICES INCORPORATED

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1.0 INTRODUCTION

This Work Plan was prepared by Ebasco Services Incorporated (Ebasco) for the U.S. Environmental Protection Agency (EPA) Region IV, under the REM III Program (Contract No. 68-01-7250, Work Assignment No. 189-4L15). Together with the accompanying Field Operations Plan (FOP), which consists of the Field Sampling and Analysis Plan (FSAP) and the Health and Safety Plan (HASP), it describes Ebasco's approach to completing the Remedial Investigation/Feasibility Study (RI/FS) for the Bluff Road Site.

The potentially responsible parties (PRPs) for the Bluff Road site RI/FS will be conducting the work. This Work Plan and the FOP have undergone revisions, at the direction of the EPA, so that the work may be conducted by the PRPs, outside of the REM III program requirements.

Guidance for developing this RI/FS Work Plan was provided by the following:

- o Guidance on Remedial Investigations under CERCLA (June 1985);
- o Guidance on Feasibility Studies under CERCLA (June 1985);
- o The National Oil and Hazardous Substances Contingency Plan (NCP), 40 CFR 300;
- o The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), Public Law 96-510, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA);
- o Standard Operating Procedures and Quality Assurance Manual, Engineering Support Branch, U.S. EPA, Region IV, April 1986;
- o REM III Program Guidelines;
- o Superfund Public Health Evaluation Manual (Draft), December 1985; and
- o Superfund Exposure Assessment Manual (Draft), January 1986.

A Remedial Investigation (RI) of the Bluff Road site was initiated in 1984 by Golder Associates (Golder) under the direction of the South Carolina Department of Health and Environmental Control (SCDHEC). Versar, Inc., (Versar) reviewed Golder's Draft RI Report for the EPA under the TES III program (Work Assignment No. 353 of EPA Contract No. 68-01-731). As a result of this review, Versar identified data gaps in the Golder RI, developed recommendations to fill those gaps, and prepared written plans for completing the Bluff Road RI/FS. Versar's project plans, as reviewed and approved by the EPA, consist of:

- o Final Remedial Investigation/Feasibility Study Completion Work Plan (submitted July 8, 1987);
- o Final Sampling Plan (submitted August 18, 1987);
- o Final Data Management Plan (submitted August 18, 1987); and
- o Final Health and Safety Plan (submitted September 8, 1987).

On September 25, 1987, following acceptance of the four Versar plans, the EPA issued Work Assignment No. 189-4L15 to Ebasco to conduct the RI/FS under the REM III program. The first requirement of this assignment was the preparation of this detailed project Work Plan.

Ebasco's project planning for the Bluff Road RI/FS is based on the previous project scoping/planning activities conducted by Versar.

This Work Plan includes all of the essential elements of the RI/FS program recommended in the Versar Work Plan but has been reorganized and expanded to conform to the latest requirements of EPA guidelines for preparing RI/FS Work Plans and conducting RI/FS projects. Specific elements that have been added to this Work Plan that were not explicitly addressed in Versar's Work Plan include:

- o A preliminary identification of Applicable or Relevant and Appropriate Requirements (ARARs);
- o Development of preliminary remedial response objectives;
- o Preliminary identification of applicable remedial technologies;

- o Definition of Data Quality Objectives (DQOs);
- o Consideration of a possible Expedited Response Action for an above ground tank that remains on the site; and
- o Community Relations support.

The Versar RI/FS Completion Work Plan and Sampling Plan developed a recommended scope of study for RI field investigations. However, these recommendations lacked specificity regarding the types, numbers and locations of sampling points, the procedures for sample collection, sample analytical protocols, and analytical data quality objectives. These elements have been specified in this Work Plan and the accompanying FOP.

Versar's Data Management Plan specified QA/QC requirements for field and laboratory procedures, for management of data, and for management of project files. Versar's requirements are not consistent with the current EPA-approved requirements and have been replaced in this Work Plan and the accompanying FOP.

In order to avoid unnecessary duplication of effort, Ebasco has attempted to limit discussion of certain subjects in this Work Plan that are typically discussed in detail in RI/FS Work Plans. These limited discussions include:

- o Discussions of the site background, environmental setting, history and current status. These subjects have been discussed in detail in other documents relating to the site (specifically, the Golder RI, the Versar project plans identified above, and EPA and SCDHEC file reports).
- o Detailed descriptions of the format and content of the final RI/FS reports. Shortcomings of the Golder RI report are explicitly addressed in the Versar Work Plan. Overall report organization and content requirements are included in EPA guidance documents on performance of RI/FSs, selection of remedies, and preparation of Records of Decision.

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This RI/FS Work Plan contains six sections, including this Introduction (Section 1.0). Section 2.0 provides background information on the location, general characteristics, history, and current status of the site. Section 3.0 outlines the scoping of the RI/FS. The various tasks which comprise the RI and FS portions of the program are described in Sections 4.0 and 5.0, respectively. Project management aspects, including quality assurance, data management and schedule, are discussed in Section 6.0.

2.0 SITE BACKGROUND

2.1 SITE LOCATION AND GENERAL CHARACTERISTICS

The Bluff Road Site is located in a mostly rural area on State Route 48 (Bluff Road), approximately 10 miles southeast of Columbia, Richland County, South Carolina (Figure 2-1). It is bordered on the southwest by Bluff Road, on the southeast by Campbell's Garage (abandoned), and on the northeast and northwest by wooded land. A large industrial facility (Westinghouse Electric Corporation, Nuclear Fuel Division) is located across Bluff Road from the site. The nearest residences are located along Bluff Road approximately one mile to the northwest and one mile to the southeast of the site.

The site lies on a nearly flat, poorly drained terrace in the valley of the Congaree River, at an elevation of approximately 138 feet above mean sea level (MSL). The river lies approximately 4 miles south of the site. The site is drained by overland flow, by a drainage ditch, and by an unnamed tributary to Myers Creek (see Figure 2-1). Myers Creek enters the Congaree River approximately six miles south of the site. The extent of contamination in the water and sediments of drainage paths has not been determined.

The site is located near the landward boundary of the Upper Coastal Plain physiographic province. In this area, clastic sedimentary deposits of Cretaceous and Tertiary age overlie older crystalline rocks. A surficial sand unit is the uppermost aquifer in the region. The water table in this unit is generally encountered at a depth of about eight to ten feet below the land surface.

A clay unit underlies the surficial sands at a depth of about 50 feet. This clay unit serves as an aquitard, restricting the downward flow of groundwater from the surficial aquifer, and serving as a confining layer on the underlying sand aquifer. This lower confined aquifer is an important source of water supplies in the region. It has not been determined whether this lower aquifer has been contaminated.

Additional information on the site environmental characteristics is provided in the FOP and the Golder RI report.

2.2 SITE HISTORY

The Bluff Road Site was operated by South Carolina Recycling and Disposal, Inc. (SCRDI) as a storage, recycling, and disposal facility for waste chemicals from 1976 to 1982. An acetylene manufacturing facility was located on the property prior to its use as a waste management facility.

In March 1980, a site inspection was conducted by the U.S. EPA. The inspection revealed containers of chemicals leaking into drainage ditches and into an onsite surface lagoon (previously used by the acetylene manufacturer). Analysis of the drainage ditch sediments revealed the presence of organics, pesticides, and metals.

The South Carolina Department of Health and Environmental Control (SCDHEC) conducted groundwater investigations at the site in 1980 and 1981. The groundwater investigations documented an increase in levels of organic contaminants at the site during that span of time.

In 1982 and 1983, a preliminary clean-up of the site was performed by a group of Potentially Responsible Parties (PRPs) under the direction of the SCDHEC and the U.S. EPA. Drums of chemicals and contaminated soil were removed. However, the onsite lagoon, an above ground tank, and possible filled lagoon material next to the onsite lagoon (reported to be lime from the acetylene manufacturing operation) were left on the site.

In November, 1984, a Remedial Investigation (RI) of the Bluff Road Site was initiated by Golder Associates under the direction of the SCDHEC. The RI was conducted in a phased manner. The phases encompassed the following tasks:

- 1) Background data collection;
- 2) Collection of soil, lagoon, and sludge samples;
- 3) Geophysical survey;
- 4) Installation and sampling of groundwater monitoring wells. This program is referred to in the Golder RI as the Initial Well Program. Also, a soil gas survey was conducted to determine the extent of volatile organic contamination; and

- 5) Installation and sampling of groundwater monitoring wells. This program is referred to in the RI as the Second Well Program. A pump test was also conducted as part of this program to determine the hydraulic conductivity of the uppermost aquifer. Water collected during the pump test was aerated in an attempt to remove volatile organics from the contaminated ground water. This activity was completed in January 1986.

Golder Associates submitted the current draft of the RI report to the SCDHEC and the EPA in April 1986. At that time, no work had been performed on the FS portion of the RI/FS. Upon preliminary examination of the RI report, the EPA found that data gaps might exist in the Golder RI and that additional site characterization work might be required.

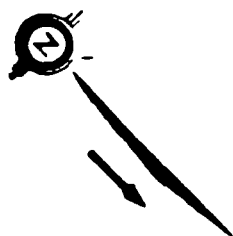
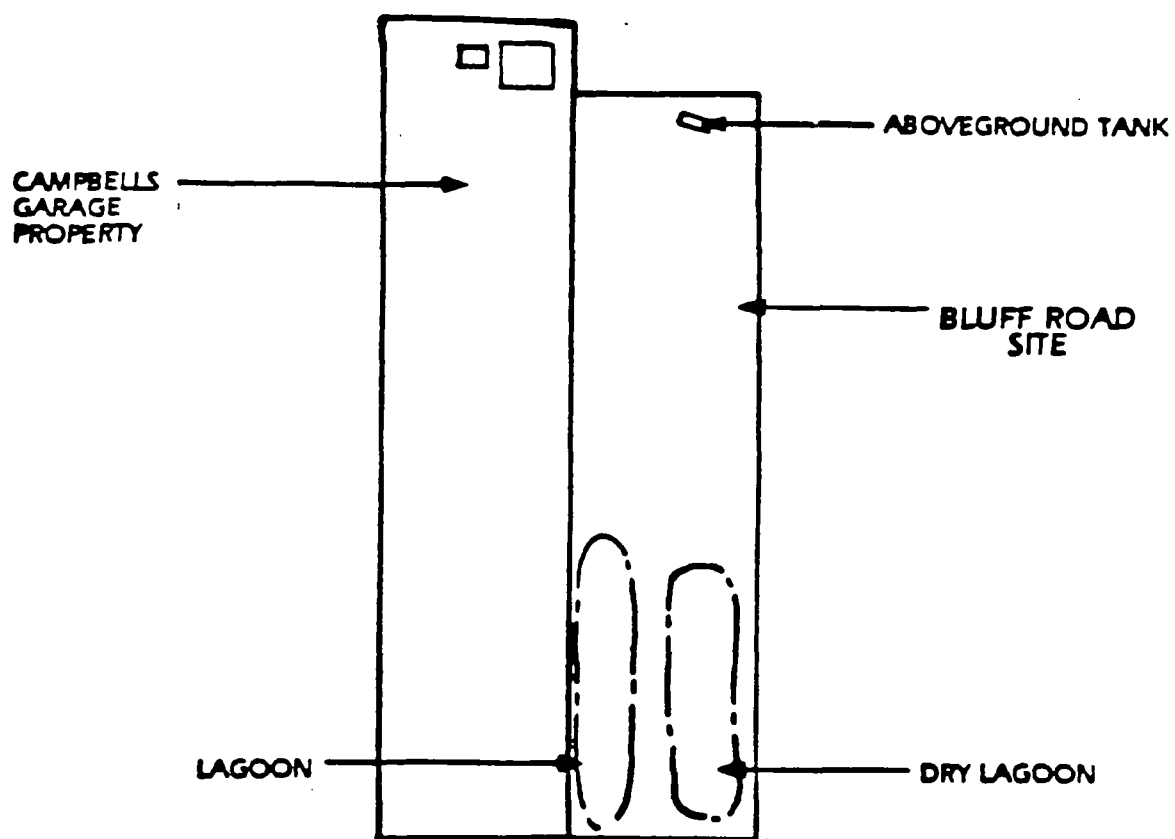
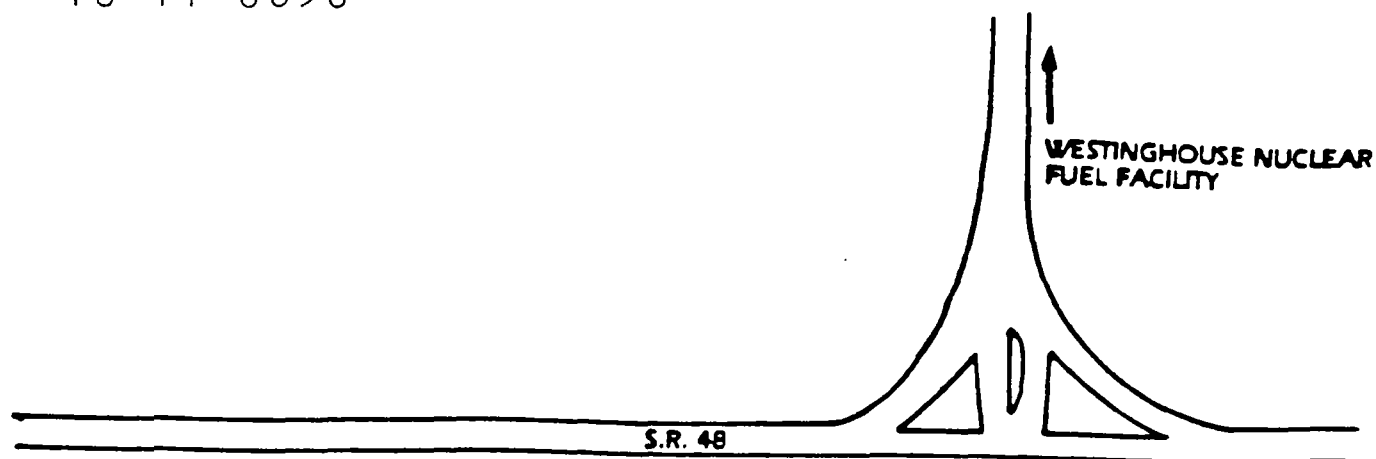
EPA then issued a work assignment, under the TES III program, for a comprehensive review of the Golder RI and preparation of plans for filling identified data gaps and completion of the RI/FS. This work was initiated by Versar, Inc. Versar submitted final Work Plans, Sampling Plans, Health and Safety Plans, and Data Management Plans during the third quarter of calendar year 1987.

2.3 CURRENT SITE STATUS

Hazardous substances, principally volatile organic compounds and metals, remain on the site in contaminated soils and in the groundwater. In addition, as reported in the Golder RI, one above ground tank contains sludge that is highly contaminated with 2-chlorophenol and phenol. A generalized map of the site is shown in Figure 2-2. Additional information on the contaminants present at the site is presented in Section 3.1.

The extent and magnitude of contamination on and off the site in soils, groundwater, and drainage pathways have not been fully defined. Versar, Inc. has completed a comprehensive review of the Golder RI report, and has identified areas in which data gaps exist, data are questionable, and report deficiencies exist. Versar also has developed general plans for the work required to correct the identified deficiencies.

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NOT TO SCALE

REM III
GENERAL SITE PLAN
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

FIGURE

2-2

EDASCO

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The EPA assigned Ebasco the tasks of implementing the RI completion activities and conducting the FS under the REM III program. Ebasco reviewed Versar's plans and prepared this Work Plan and the accompanying Field Operations Plan to define the scope of the RI/FS completion assignment.

Subsequent to the REM III Work Assignment, EPA negotiations with the PRPs led to an agreement. That agreement directs the PRPs to perform the required work.

3.0 SCOPING OF THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Previous investigations have confirmed that contamination remains on the site. However, they did not adequately define the extent or magnitude of that contamination. Versar, Inc. completed a comprehensive review of the previous investigations for the EPA, and developed a scope of work for completion of the Bluff Road site RI/FS. Versar's recommended scope was reviewed and approved by the EPA and is presented in the document titled "Final Remedial Investigation/Feasibility Study Completion Work Plan" (Versar, Inc., July 8, 1987). Ebasco conducted a detailed review of the Versar RI/FS Completion Work Plan and developed a detailed approach to implementing its recommendations. That approach is presented in this document and the accompanying FOP.

Ebasco's approach incorporates the essential work elements recommended by Versar, and portions of this document have been extracted directly from the Versar RI/FS Completion Work Plan (with minor editorial revision). Additional investigative activities on the existing above ground tank at the site (see Section 3.2.4) are also included in this plan.

In addition, minor elements of Versar's recommended field investigations have been modified in order to achieve greater cost-effectiveness. Others were eliminated because they were not essential to the identification and evaluation of remedial alternatives.

In order to ensure that the scope of work would fulfill the data requirements of the project, Ebasco identified Applicable or Relevant and Appropriate Requirements (ARAR's), remedial response objectives, potential response actions and associated technologies, and the data required to evaluate the remedial technologies. Specific objectives for the RI/FS project completion and data quality objectives were then defined. The results of these efforts are discussed in the following subsections. Ebasco also conducted a preliminary risk assessment. However, this assessment has been excluded from the Work Plan at the direction of the EPA.

3.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

One of the primary concerns in the development of remedial action alternatives for sites governed by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is the degree of public health or environmental protection afforded by each remedy. EPA policy states that in the process of developing and selecting remedial action alternatives, primary consideration should be given to actions that attain or exceed Applicable or Relevant and Appropriate Requirements (ARARs), as defined by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the Superfund Amendments and Reauthorization Act (SARA). The purpose of this requirement is to make CERCLA response actions consistent with other pertinent Federal and state environmental requirements.

SARA defines an ARAR as:

- o Any standard, requirement, criterion, or limitation under Federal environmental law.
- o Any promulgated standard, requirement, criterion, or limitation under a state environmental or facility siting law that is more stringent than the associated Federal standard, requirement, criterion, or limitation.

Applicable requirements are Federal public health and environmental requirements that would be legally applicable to a remedial action if that action was not undertaken pursuant to CERCLA. For example, if hazardous waste activities were undertaken pursuant to an approved permit, applicable regulations would be available to legally define the required remedial action for site closure. Relevant and appropriate requirements are Federal public health and environmental requirements that apply to circumstances sufficiently similar to those encountered at CERCLA sites, where their application would be appropriate although not legally required. In addition, SARA now requires that state ARARs be considered during the assembly of remedial alternatives if they are more stringent than Federal requirements. EPA has also indicated that "other" criteria, advisories, and guidelines must be considered in devising remedial alternatives.

A listing of the preliminary Federal ARARs identified for the Bluff Road site is provided in Table 3-1. State of South Carolina ARARs have not formally been identified by SCDHEC for the Bluff Road site. However, several types of state regulations may become ARARs depending on whether specific state standards are more stringent than corresponding federal requirements. These are summarized in Table 3-2.

The ARARs will be considered at six decision points during the RI/FS. These include :

1. Task 1 - Work Plan Development: Chemical and location specific ARARs are considered to ensure that sampling and analysis are appropriately planned.
2. Task 6 - Public Health Evaluation: Consider ARARs during the analysis of the risks to public health and the environment.
3. Task 9 - Development of Remedial Objectives: Compare site data base to all ARARs.
4. Task 9 - Identification of Applicable Technologies and Assembly of Alternatives: Utilize ARARs specific to site conditions for development of action levels, specific response objectives, and remedial alternatives relative to criteria defined in 40 CFR 300.68(f). Also, identify ARARs that apply to the formulated alternatives.
5. Task 9 - Screening of Remedial Technologies/ Alternatives: Consider ARARs when assessing the effectiveness of an alternative, as defined in 40 CFR 300.68(g)(3).
6. Task 10 - Remedial Alternatives Evaluation: Evaluate each alternative to the extent it attains or exceeds ARARs, as defined in 40 CFR 300.68(h)(2)(iv).

3.2 SCOPING OF REMEDIAL TECHNOLOGIES

Preliminary remedial response objectives were identified during development of this Work Plan. Potential remedial actions and associated technologies were identified. The scope of the RI was then reviewed to ensure that adequate data are collected to

TABLE 3-1

FEDERAL APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS
BLUFF ROAD SITE

Requirement	Rationale
1. Hazardous Waste Requirements (RCRA Subtitle C, 40 CFR, Part 264)	Standards applicable to treatment, storage and disposal of hazardous waste.
2. Safe Drinking Water Act	
a. Maximum Contaminant Levels (MCLs)	Remedial actions may be required to provide cleanup to the MCLs.
b. Maximum Contaminant Level Goals (MCLGs)	SARA Section 121(d)(2)(A)(ii)
c. Underground Injection Control Regulations (40 CFR, Parts 144, 145, 146, and 147)	May be applicable to onsite groundwater recirculation systems.
3. Toxic Substances Control Act (15 U.S.C. 2601)	
a. PCB Requirements (40 CFR 761)	PCBs are possible site contaminants.
b. TSCA health data, chemical advisories, and Compliance Program policy	Considered in the public health evaluation.
4. Health Advisories, EPA Office of Drinking Water	sampling activities may reveal presence of chemical for which health advisories are listed.

TABLE 3-1 (CONTINUED)
FEDERAL APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS
BLUFF ROAD SITE

Requirement	Rationale
5. Clean Water Act (PL92-500)	
a. State water quality standards	See Table 3-2
b. Federal water quality criteria (FWQC)	Remedial actions may provide groundwater remediation and discharge to surface waters.
c. NPDES permit	Remedial alternatives may include discharge to surface waters.
6. Clean Air Act (42 U.S.C. 7401)	
a. National Ambient Air Quality Standards (NAAQS) for six criteria pollutants (40 CFR Part 50)	Remedial alternatives may include incineration or soil/groundwater water volatilization technologies.
b. Public health basis to list pollutants as hazardous under Section 112 of the Clean Air Act	Remedial alternatives may include incineration or soil/groundwater volatilization technologies.
7. OSHA Requirements (29 CFR, Parts 1910, 1926, and 1904)	Required for workers engaged in onsite remedial activities.
8. Executive Order 11988 (Floodplain Management)	Floodplain resources may be affected by the site remedial alternatives.

TABLE 3-1 (CONTINUED)
FEDERAL APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS
BLUFF ROAD SITE

Requirement	Rationale
9. DOT Rules for Hazardous Materials Transport (49 CFR, Parts 107, 171.1-171.500)	Remedial alternatives may include offsite treatment and disposal.
10. Endangered Species Act of 1978 (16 U.S.C. 1531)	Considered in the public health and environmental assessment.
11. Fish and Wildlife Coordination Act (16 U.S.C. 661)	Remedial alternatives may affect protected habitats.
12. Fish & Wildlife Improvement Act of 1978 (16 U.S.C. 742)	Remedial alternatives may affect protected habitats.
13. Fish & Wildlife Conservation Act of 1980 (16 U.S.C. 2901)	Remedial alternatives may affected protected habitats.
14. Pesticide Registration, Tolerances and Action Levels	Pesticide contaminants present at the site.
15. Health Effects Assessments	Considered in the public health risk assessment.
16. EPA's Groundwater Protection Strategy	Remedial alternatives must consider EPA classification of groundwater conditions at site.

Source: 50 Federal Register 224, Wednesday, November 20, 1985.

TABLE 3-2
STATE AND LOCAL APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS
BLUFF ROAD SITE

Requirement	Rationale
1. Water Quality Standards	Remedial action may be required to provide cleanup to meet these standards.
2. Air Quality Regulations	Remedial alternatives may include incineration or soil/groundwater volatilization technologies.
3. Monitoring/Production	Monitoring well designs may require SCDHEC approval; remedial alternatives may include groundwater withdrawal and treatment.
4. Sediment Control/Storm Water Discharges	Remedial action may be required to provide cleanup to meet standards.
5. Hazardous Waste	Remedial alternative may include offsite treatment, transportation, and disposal.
6. Other requirements	Specific to implementation of a remedial action.

evaluate these technologies and subsequent assembled remedial alternatives in the FS. The approach for this technology screening and evaluation is presented in Section 5.0 of this Work Plan.

3.2.1 Preliminary Remedial Response Objectives

Additional data for the Bluff Road site are needed to fully define the current threat to public health, welfare, and the environment. However, previous work has been sufficient to identify the following preliminary remedial response objectives;

- o Reduce or eliminate public and environmental exposure to contaminants present in soil, tanks, and/or lagoon sediment/sludge;
- o Reduce or eliminate public exposure to contaminants present in groundwater;
- o Reduce or eliminate human exposure to airborne contaminants; and
- o Reduce or eliminate impacts due to the offsite migration of contaminants via groundwater, surface water, and air pathways.

The RI will define the type, extent and magnitude of the contamination which remains on the site; the toxicological characteristics of the contaminants present; the degree to which the contaminants have migrated or may potentially migrate off the site; and the potential for human exposure to harmful substances and the public health risk posed by the site. The preliminary response objectives identified above will be supplemented, refined or, if appropriate, eliminated during this process.

3.2.2 Preliminary Scoping of Remedial Actions

Potential site problems which have been identified during the previous investigations or that may be identified during the planned RI include on site waste materials, contaminated soils, contaminated surface water and sediment, and leachate and contaminated groundwater. General response actions to address these site problems may include removal and on site or off site disposal; in-situ treatment; onsite or offsite treatment; containment; diversion; ground water controls; provision of alternative water supplies; or other of the general remedial

response actions listed in Table 3-3. These general response actions will be reviewed during the FS to identify those actions which are applicable to specific site problems. Potential remedial actions fall into the following categories:

- o Source control actions;
- o Management of contaminant migration actions; and
- o No action.

Source Control Actions - Actions designed to prevent or minimize migration of hazardous substances from the source material. At the Bluff Road site, potential sources are the above ground tank, contaminated on site soils, and the water and sediment/sludge in the lagoon(s).

Management of Migration Actions - Actions designed to manage the migration of hazardous substances that have migrated (or may migrate) from the contaminant source to pose a threat to public health or the environment. At the Bluff Road site, contaminants have migrated offsite via surface runoff, groundwater flow, and possibly through the air. If the final risk assessment shows that migration of contaminants poses a threat, contaminant migration control actions may be required.

No Action - If the final risk assessment shows that the site poses no significant threat to public health or the environment, no further action may be necessary except for possible access restriction or other institutional constraints.

3.2.3 Preliminary Scoping of Remedial Technologies

Typical remedial technologies associated with the general response actions are listed in Table 3-4. A more extensive list of technologies is included in Appendix A. Specific technologies or groups of technologies to accomplish the general response actions will be developed during the FS. This will be based on an evaluation of their applicability and effectiveness in addressing the specific problems identified at the Bluff Road site. Site characteristics or waste characteristics that might alter the effectiveness of a remedial technology at the Bluff Road Site will be considered in the review of technologies. Table 3-5 lists some site and waste characteristics to be considered.

TABLE 3-3
GENERAL REMEDIAL RESPONSE ACTIONS

Containment
Pumping
Collection
Diversion
Complete Removal
Partial Removal
Onsite Treatment
In-Situ Treatment
Storage
Onsite Disposal
Offsite Disposal
Alternative Drinking Water Supply
Relocation of Receptors
Other Offsite Measures
Other Institutional Controls
No Action

TABLE 3-4

GENERAL RESPONSE ACTIONS AND ASSOCIATED
REMEDIAL TECHNOLOGIES

General Response Action	Technologies
No action	Some monitoring and analyses may be performed.
Containment	Capping; groundwater containment barrier walls; bulkheads; gas barriers.
Pumping	Groundwater pumping; liquid removal; dredging.
Collection	Sedimentation basins; French drains; gas vents; gas collection systems.
Diversion	Grading; dikes and berms; stream diversion ditches; trenches; terraces and benches; chutes and downpipes; levees; seepage basins.
Complete Removal	Tanks; soils; sediments; liquid wastes; contaminated structures; sewers and water pipes.
Partial Removal	Tanks; soils; sediments; liquid wastes.
Onsite Treatment	Incineration; solidification; land treatment; biological, chemical, physical treatment, and thermal stripping.
Offsite Treatment	Incineration; biological, chemical, and physical treatment.

TABLE 3-4 (Continued)

GENERAL RESPONSE ACTIONS AND ASSOCIATED
REMEDIAL TECHNOLOGIES

General Response Action	Technologies
In-situ Treatment	Permeable treatment beds; bioreclamation; soil flushing; neutralization; land farming, solidification; and volatilization/vacuum extraction.
Storage	Temporary storage structures.
Onsite Disposal	Landfills; land application.
Offsite Disposal	Landfills; surface impoundments; land application.
Alternate Water Supply	Cisterns; aboveground tanks; deeper or upgradient wells; municipal water system; relocation of intake structure; individual treatment devices.

TABLE 3-5

SITE CHARACTERISTICS THAT MAY
AFFECT REMEDIAL TECHNOLOGY SELECTION

Site volume	Depth to bedrock
Site area	Depth to aquicludes
Site configuration	Degree of contamination
Disposal methods	Direction and rate of groundwater flow
Climate (precipitation, temperature, evaporation)	Receptors
Soil texture and permeability	Drinking water wells
Soil moisture	Surface waters
Slope	Ecological areas
Drainage	Existing land use
Vegetation	Depths of groundwater or plume

WASTE CHARACTERISTICS THAT MAY AFFECT
REMEDIAL TECHNOLOGY SELECTION

Quantity/concentration	Infectiousness
Chemical composition	Solubility
Acute toxicity	Volatility
Persistence	Density
Biodegradability	Partition coefficient
Radioactivity	Compatibility with other chemicals
Ignitability	Treatability
Reactivity/corrosivity	

The technologies which are judged to be feasible will then be combined into remedial action alternatives. Each alternative will be composed of one or more technologies capable of addressing the entire range of problems at the site. Specific technologies considered for potential remedial action alternatives may include capping, ground water barriers, ground water pumping and treatment, complete or partial removal, soil flushing, soil aeration, air stripping, and runoff controls.

3.2.4 Expedited Response Action

An above ground tank currently remains on the Bluff Road site. The Golder RI report indicated that this tank contains sludge that is highly contaminated with 2-chlorophenol and phenol. Ebasco believes that an Expedited Response Action (ERA) directed toward remediation of this tank may be warranted.

The EPA has directed the PRPs to evaluate the current situation regarding the tank, utilizing information from previous studies. The PRPs are then to provide an Engineering Evaluation and Cost Analysis (EE/CA) describing the type and extent of an ERA that could be implemented. This will be provided within 30 days of approval of the Final Work Plan.

The need for any additional sampling of the tank will be discussed in the EE/CA. If the EPA does not elect to conduct an expedited tank response action, the tank will be addressed during the Feasibility Study as described in Section 5.0 of this Work Plan.

3.2.5 Data Required to Evaluate the Remedial Technologies

After reviewing remedial technologies, data required to evaluate these technologies were identified. Limited data were obtained in the Golder RI. The Ebasco RI will update these data and collect additional information not previously obtained. Specific data requirements include:

- o Characterization of the contaminants in order to assess the human health and environmental risks associated with the site, and to determine the applicability and effectiveness of potential remedial technologies.

- o Characterization of the hydrogeology, the degree of ground water contamination, and water use patterns at the site, to evaluate the potential for off site migration of contaminants via ground water, the risk posed to drinking water supplies, and the feasibility of ground water remediation (containment, pumping and treatment) strategies.
- o Characterization of the site soils and their degree of contamination, both vertically and horizontally, to assess the human health and environmental risks associated with the site, and the feasibility of soil remediation strategies.
- o Characterization of site runoff and drainage, and the hydrology and ecology of area streams, to determine whether the surface water pathway poses a significant risk to human health or the environment, and, if it does, to evaluate the feasibility of surface water remediation strategies.

3.3 RI/FS OBJECTIVES

The objectives of the field, laboratory, and study efforts are to collect data sufficient to analyze the risks to human health and the environment, to determine the applicability and effectiveness of remedial technologies, and to evaluate the feasibility of remedial alternatives. Specific contaminant sources of concern include the existing tank, onsite contaminated soils, and, possibly, the existing onsite lagoon(s). Specific contaminant migration pathways of concern are the shallow and deep ground water systems, and the surface water drainage system. The specific receptors of concern are casual visitors to contaminated onsite areas, consumers of local ground water, users of local surface water bodies, and the local terrestrial and aquatic flora and fauna. The specific objectives and purposes for each of the distinct elements of the RI field investigation are presented in Section 4.3

3.4 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are established to ensure that the data collected are sufficient and of adequate quality for their intended uses. Five data quality levels are typically recognized, Levels I through V, as follows:

- o Level I data can be collected using portable instruments and are typically used for gross engineering determinations or for health and safety screening.
- o Level II data are the result of field analyses using portable instruments or mobile laboratories that are not generally subject to strict QA/QC procedures. These data can be used to determine the presence or absence of specific pollutants or for screening to determine sampling locations.
- o Level III data are generated by non-CLP laboratories using standard EPA analytical methods. Level III data can be used for timely receipt of analytical results and can be confirmed with Level IV data.
- o Level IV data are generated by laboratories using CLP analytical protocol. Level IV data have extensive reporting requirements and are generally necessary in situations where legally defensible data are needed.
- o Level V data are generated by special analytical services provided by laboratories that follow CLP (Level IV) QA/QC procedures.

At the Bluff Road site the reporting requirements for legally defensible data are necessary, since there are Potentially Responsible Parties and enforcement action and/or litigation is possible. Data Quality Level IV is intended for most of the sample analyses. Samples requiring fast turnaround (because they will guide subsequent site characterization activities) will be sent for Level III analysis via a local laboratory. The requirements of Level III analysis is provided in Appendix A of the FOP. Ten percent of these samples will be split and sent through the CLP for confirmation analysis at Data Quality Level IV. This will allow for timely reporting of analytical results and provide data verification by duplicate analysis. The data quality levels established for each sampling activity at the Bluff Road site are presented in Table 3-6.

TABLE 3-6
DATA QUALITY OBJECTIVES FOR EACH SAMPLING TASK
BLUFF ROAD SITE

Sampling Activity	Objectives	Data Quality Level
Surface Soils	To locate and characterize areas of surface soil contamination. Results will be used to direct other field activities, in risk assessment, and in evaluating remedial alternatives.	III
Surface Soils	To confirm results of quick turnaround sampling; provide enforcement quality data on surface soil contamination.	IV
Groundwater (Existing Wells)	Follow-up of previous sampling to reassess contamination. Results will be used to locate temporary wells.	III
Surface Water	To determine if Myers Creek and its tributaries are impacted by contaminants from the site. Data will be used in risk assessment and in evaluation of remedial alternatives.	IV

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TABLE 3-6 (Continued)
DATA QUALITY OBJECTIVES FOR EACH SAMPLING TASK
BLUFF ROAD SITE

Sampling Activity	Objectives	Data Quality Level
Stream Sediments	To determine if Myers Creek and its tributaries are impacted by contaminants from the site. Data will be used in risk assessment and in evaluation of remedial alternatives.	IV
Lagoon Surface Water	To determine if the water contained in the onsite lagoon is contaminated. Results will be used in the evaluation of alternatives.	IV
Lagoon Sediments	To determine if the sediment contained in the onsite lagoon is contaminated. Results will be used in the evaluation of alternatives.	IV
Lagoon Perimeter Soils	To determine if the shallow soil strata surrounding the lagoon areas are contaminated. Results will be used in evaluating alternatives.	IV

TABLE 3-6 (Continued)
DATA QUALITY OBJECTIVES FOR EACH SAMPLING TASK
BLUFF ROAD SITE

Sampling Activity	Objectives	Data Quality Level
Groundwater (Temporary Wells)	To trace the groundwater plume and aid in determining locations of new permanent monitoring wells. Rapid turnaround is necessary to facilitate field activities. Data may be used in risk assessment and in evaluation of alternatives.	III
Subsurface Soils (Split Spoon)	To determine the extent of contaminant migration in the subsurface soils. Results will be used in determining locations of new monitoring wells, risk assessment, and evaluation of alternatives.	III
Subsurface Soils (Split Spoon)	To confirm the results of quick turnaround subsurface soil sampling; provide enforcement quality data on subsurface soil contamination.	IV
Groundwater (New Monitoring Wells)	To determine the extent of ground water contamination. Results will be used for hydrogeologic determinations, risk assessment and evaluation of alternatives.	IV

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TABLE 3-6 (Continued)
DATA QUALITY OBJECTIVES FOR EACH SAMPLING TASK
BLUFF ROAD SITE

Sampling Activity	Objectives	Data Quality Level
Runoff (Sediment)	To characterize the migration of contaminants off the site via runoff. Results will be used in risk assessment.	IV
Subsurface Soils (Geotechnical)	To characterize the physical properties of the soils. Results will be used in the evaluation of alternatives.	II
Subsurface Soils (Shelby Tube)	To characterize the undisturbed physical properties of the Black Mingo Clay. Results will be used in hydrogeologic evaluations and feasibility studies.	II

4.0 COMPLETION OF THE REMEDIAL INVESTIGATION

This section describes the work that will be conducted to complete the RI for the Bluff Road site. Section 5.0 provides a detailed description of the FS tasks.

The RI activities to be conducted correspond to work elements that were initially described in the Versar Work Plan. However, the Versar tasks and subtasks have been reorganized to conform to the eight standard RI tasks, promulgated in the latest EPA guidance, as defined below:

- o Task 1 - Project Planning
- o Task 2 - Community Relations
- o Task 3 - Field Investigation
- o Task 4 - Sample Analysis and Data Validation
- o Task 5 - Data Evaluation
- o Task 6 - Risk Assessment
- o Task 7 - Treatability Study/Pilot Testing
- o Task 8 - Remedial Investigation Report

The work elements comprising these tasks are discussed in the following subsections.

4.1 TASK 1 - PROJECT PLANNING

This task encompasses preparation and submittal of the Work Plan Memorandum (submitted to EPA on November 24, 1987), the Draft and Final Work Plan, and the Draft and Final Field Operations Plan. The activities that comprise this task are:

- o Preparation of the Work Plan Memorandum;
- o Review of EPA file data;
- o Initial site visit;
- o Preliminary identification of ARARs and determination of DQOs;

- o Preliminary identification of potential remedial alternatives;
- o Preliminary risk assessment (removed at the direction of the EPA);
- o Development of detailed field investigation activities, procedures, and specifications;
- o Preparation of the draft and final Work Plan;
- o Preparation of the draft and final Field Sampling and Analysis Plan;
- o Preparation of the draft and final Site Management Plan; (removed at the direction of the EPA) and
- o Preparation of the draft and final Health and Safety Plan.

The project plans prepared in Task 1 include two major documents:

- o Work Plan (WP): The present document, which presents the scope, rationale, and schedule for the Bluff Road RI/FS; and
- o Field Operations Plan (FOP), which is composed of two documents:
 - Field Sampling and Analysis Plan (FSAP) describing the details of sampling and analytical objectives; the number and location of samples for each media; the site specific quality assurance requirements; detailed sampling and analysis procedures; decontamination of sampling equipment procedures; and data management elements.
 - Health and Safety Plan (HASP) discussing site specific health and safety information, a hazard assessment, training requirements, health and safety monitoring procedures, personnel decontamination, disposal procedures, and any other procedure in accordance with the Health and Safety Plan. The HASP will be updated on a subtask specific basis as needed.

Task 1 will be completed upon EPA approval of the Work Plan and Field Operations Plan.

4.2 TASK 2 - COMMUNITY RELATIONS

Community relations activities are not addressed in this Work Plan.

4.3 TASK 3 - FIELD INVESTIGATION

This section outlines the various field investigations that will be conducted to collect the data required to meet the RI/FS objectives outlined in Section 3.4. To coordinate field activities and provide for a smooth transition between sampling efforts, three levels of field investigation will be conducted. The first level consists of an initial site reconnaissance visit which was conducted concurrent with the TASK 1 - PROJECT PLANNING activities. The second level (consisting of site screening activities) and third level (consisting of site characterization activities) comprise the main field investigation. They will be conducted sequentially, with only one initial mobilization required.

The following activities will be conducted during the field investigation of the Bluff Road Site:

- o Site reconnaissance;
- o Qualitative air monitoring;
- o Private well inventory;
- o Surface soil sampling;
- o Surface water and sediment sampling;
- o Groundwater screening of existing wells;
- o Lagoon surface water and sediment sampling;
- o Lagoon soil sampling;
- o Installation and sampling of temporary wells;
- o Soil boring and sampling;

- o Groundwater investigations, including installation, sampling, and slug testing of new permanent monitoring wells;
- o Aquatic biota survey;
- o Abandonment of 11 existing monitoring wells; and
- o Surveying.

The specific numbers and locations of the samples to be collected under each of these activities have been determined based on the data needs identified by Versar and through discussions with the EPA. Sampling locations have generally been selected to characterize the upgradient (background), onsite, and downgradient extent of contamination in the various media.

Some sampling events and locations have been selected to address specific issues raised by Versar. For example, Versar suspects that the shallow groundwater contaminant plume has migrated beyond the furthest downgradient monitoring well currently in place. That well will be sampled during the groundwater screening of existing wells (Section 4.3.6) to determine whether the plume has in fact reached or passed that point. The results of that sampling will be considered, along with the results of other screening events (e.g., surface soils and temporary wells), to finalize the locations and numbers of permanent monitoring wells.

These activities are discussed in the following subsections. Analysis of the collected samples are specified in Section 4.4.

4.3.1 Site Reconnaissance

The entire Bluff Road site will need to be visually inspected to identify waste disposal areas, above and below ground tanks, leachate seeps, and other areas of interest which may require investigation. A list of local telephone numbers and addresses will be needed for local supplies and services. Tax maps will be needed for property ownership for offsite sampling and drilling tasks.

4.3.2 Qualitative Air Monitoring

Onsite air quality monitoring investigations will encompass two regimes of air quality monitoring to meet the following objectives:

- o General site survey to establish and verify levels of personnel and public protection; and
- o Target area survey to qualitatively identify potential sources of organic vapor emissions.

4.3.3 Private Well Inventory

To define the current and potential use of both aquifers at the site, a well inventory will be conducted identifying potential receptors within one mile downgradient from the site. Private residences will be contacted to determine if a well(s) is located on the property and to identify its use, depth, construction method, and installation if known. This information will be used to define the groundwater classification and in risk assessment.

4.3.4 Surface Soil Screening

The delineation of the extent of soil contamination at this site has been based solely on the volatile organic analysis of 18 soil samples, and a priority pollutant scan of one composite soil sample. These samples were collected in January 1985. The Golder RI report provides no rationale as to how these 18 samples were chosen for chemical analysis, given that a total of 65 soil samples had been obtained.

Soil sample locations were mainly restricted to the fenced area of the Bluff Road Site. However, six soil samples were collected upgradient of the site. No soil samples were collected downgradient and outside of the fenced area.

The results of the chemical analysis of the 18 soil samples are suspect. Many of the analytical reports were issued in June 1985. However, the samples were collected in January 1985. If this discrepancy in time cannot be explained, the volatile organic analyses of the soil samples may be considered invalid due to inappropriate holding times prior to analysis.

The previous soil gas survey conducted as part of the Golder RI will be utilized as a starting point to determine the extent of soil contamination. Thirty-four surface soil samples will be collected and analyzed to screen out and/or identify contaminated areas of the site. In addition, upgradient background samples will be collected. Downgradient samples will be collected for detection of contaminant migration. Figures 4-1 and 4-2 show the approximate locations of the surface soil samples.

4.3.5 Surface Water and Sediment Sampling

The surface water medium which was not addressed in the Golder RI report will be defined during the completion of the RI.

SCDHEC conducted a preliminary investigation of the surface water regime in March 1980. This investigation focused on the drainage ditch which runs through the site, surface run-off, surface spills, and Myers Creek. A minimum number of samples were obtained in this investigation (i.e., one upgradient and one downgradient sample for each area). Therefore, the overall problem, if any, has not been defined.

The investigation indicated increased concentrations of metals and organics between sampling points located upstream and downstream of the Bluff Road Site in Myers Creek.

In addition, the report documented an intermittent stream which is believed to join Myers Creek. This drainage way originates in an area southeast of the fenced Bluff Road Site and empties into Myers Creek directly above the downstream sampling point utilized during the SCDHEC study.

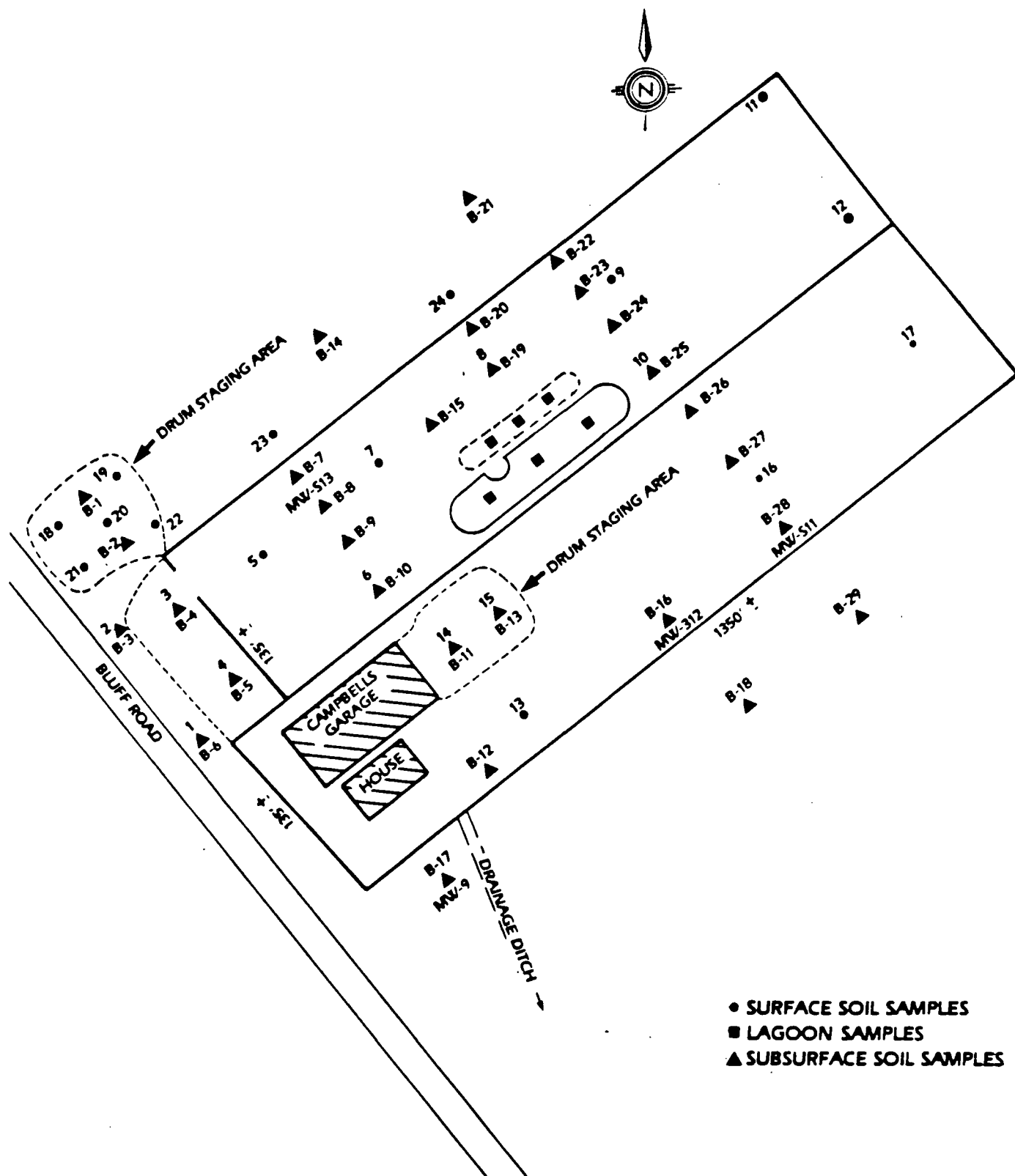
As part of the activity needed to complete the RI, a series of water and sediment samples will be collected to determine the extent of contamination, if any, in the surface water regime at the Bluff Road Site.

Additionally, sediment samples will be collected (if possible) from surface run-off areas documented in the July 1980, SCDHEC report. The proposed sampling locations are shown on Figure 4-3.

Sampling of Myers Creek

Sampling of Myers Creek will include a series of sediment samples from the creek bed. This sediment sampling will be conducted in upstream and downstream locations to determine the extent of contamination that may have occurred.

10 11 0126



- SURFACE SOIL SAMPLES
- LAGOON SAMPLES
- ▲ SUBSURFACE SOIL SAMPLES

NOT TO SCALE

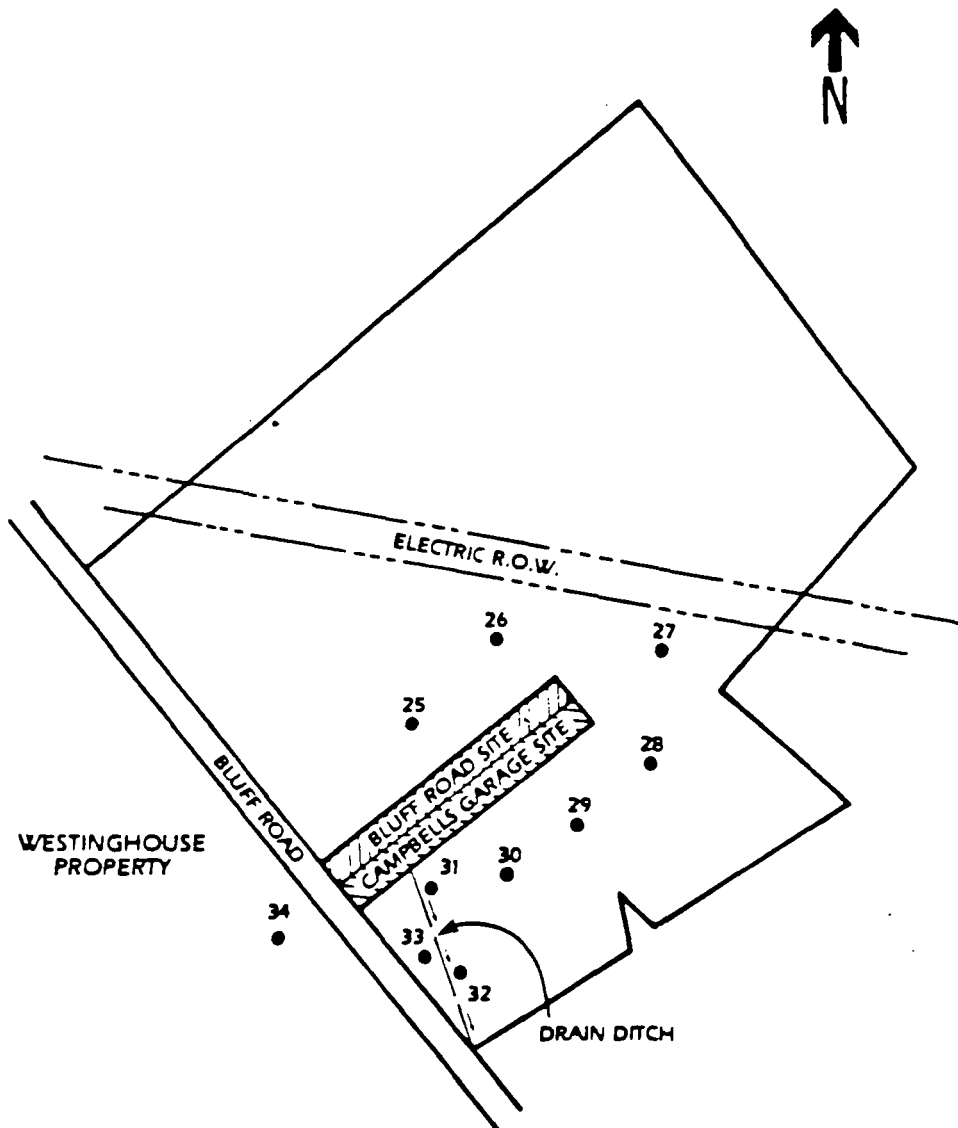
REM III
SITE SAMPLING
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

EBASCO

FIGURE

4-1

10 11 0127



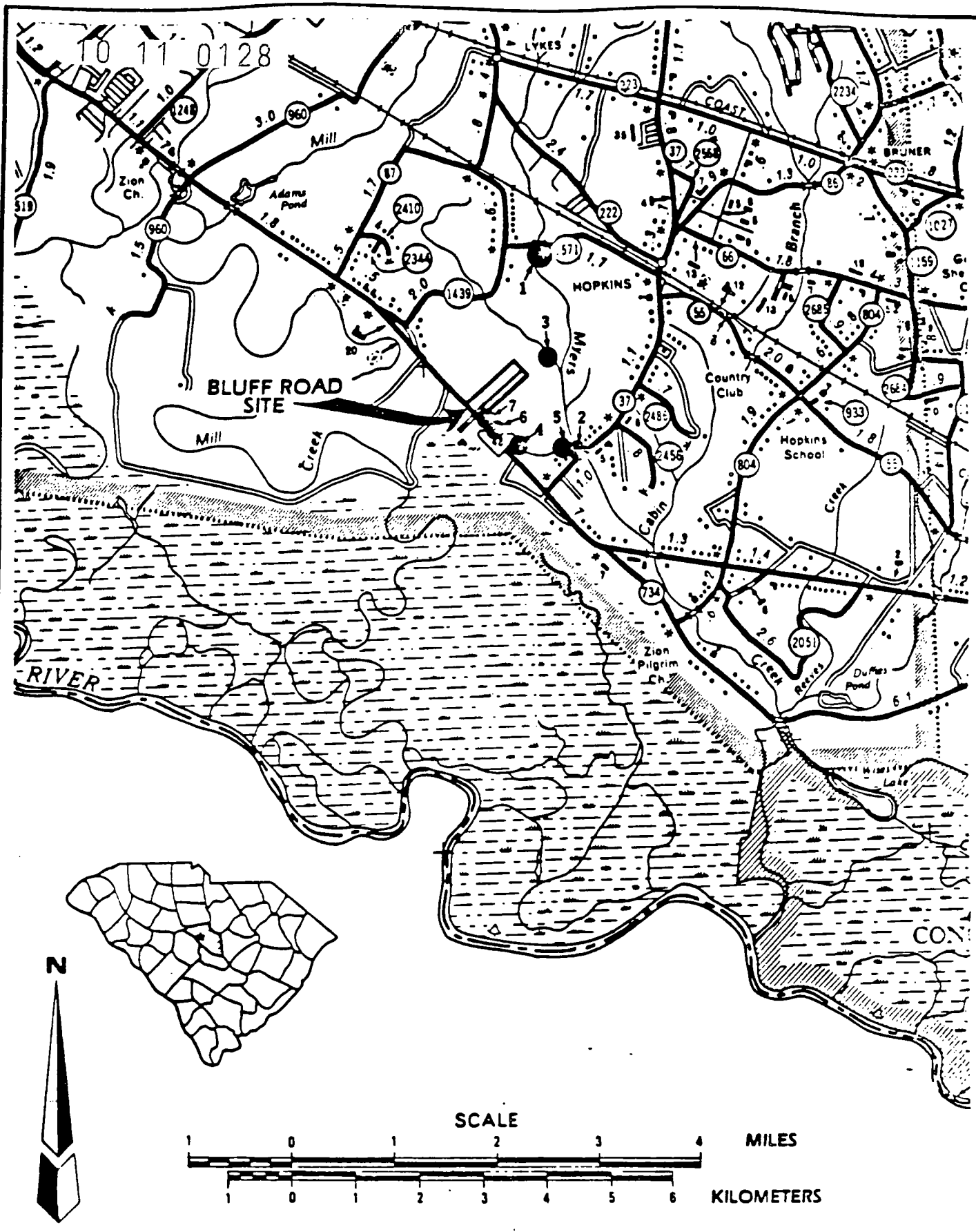
NOT TO SCALE

REM III
OFF SITE SURFACE SOIL SAMPLES
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

EBASCO

FIGURE

4-2



REM III
 SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS
 BLUFF ROAD SITE
 COLUMBIA, SOUTH CAROLINA

FIGURE

4-3

EBASCO

Additionally, water samples will be collected from any tributary streams that may drain the Bluff Road Site and empty into Myers Creek. Water samples will also be collected at groundwater discharge points in Myers Creek.

Sampling of the Intermittent Stream

Sediment samples will be collected along the intermittent stream that joins Myers Creek southeast of the Bluff Road Site. This sampling may delineate the contribution of this stream to the contamination found in Myers Creek.

If possible, water samples will also be collected from the intermittent stream.

Sampling of the Drainage Ditch

The drainage ditch, which may empty into the Congaree River, will also be sampled to determine if it may be contributing pollutants offsite. Sampling will consist of sediment and surface water collection.

4.3.6 Groundwater Screening

During previous investigations the overall water quality of both aquifers had not been clearly identified. Although numerous groundwater samples have been collected from the surficial aquifer at the site, only two of these samples have been subjected to a Target Compound List (TCL) scan. Additionally, the upgradient groundwater samples collected from well P-6, a surficial aquifer monitoring well, have had small amounts of organic compounds (<5 ppm) detected in the groundwater. Figure 4-4 shows the location of well P-6.

To more clearly identify water quality, 25 groundwater samples will be collected from existing monitor wells installed by Golder & Associates and analyzed for TCL metals and volatile organic compounds by a local laboratory for quick turnaround service. These data will aid in determining the rate at which the groundwater contaminant plume is migrating and provide guidance for new monitor well locations.

4.3.7 Lagoon Surface Water and Sediment Sampling

The Golder RI does include analyses of wastes from the onsite lagoon. However, this characterization consisted of one composite sample of lagoon water and one composite sample of lagoon sediment which were analyzed for target compound list analyses. Seven sediment cores were collected from the lagoon, however, only six samples were composited. No explanation was provided for this discrepancy in sample compositing. No analyses were conducted to define the composition of each layer within the lagoon. No samples were collected from the closed lagoon.

Additionally, the holding times of the samples collected for waste characterization are suspect. The analysis for volatile organics appears to have been completed in 33 days from the time of sample collection. The normal holding time for the completion of this analysis is 14 days.

To characterize the lagoon surface water and sediment quality, three locations will be used to collect samples at the open lagoon (see Figure 4-1). All samples will be collected in accordance with the procedures discussed in Section 4.6 and 4.11 of ESD SOPs. These samples will be analyzed by a CLP laboratory for TCL compounds.

4.3.8 Lagoon Soil Sampling

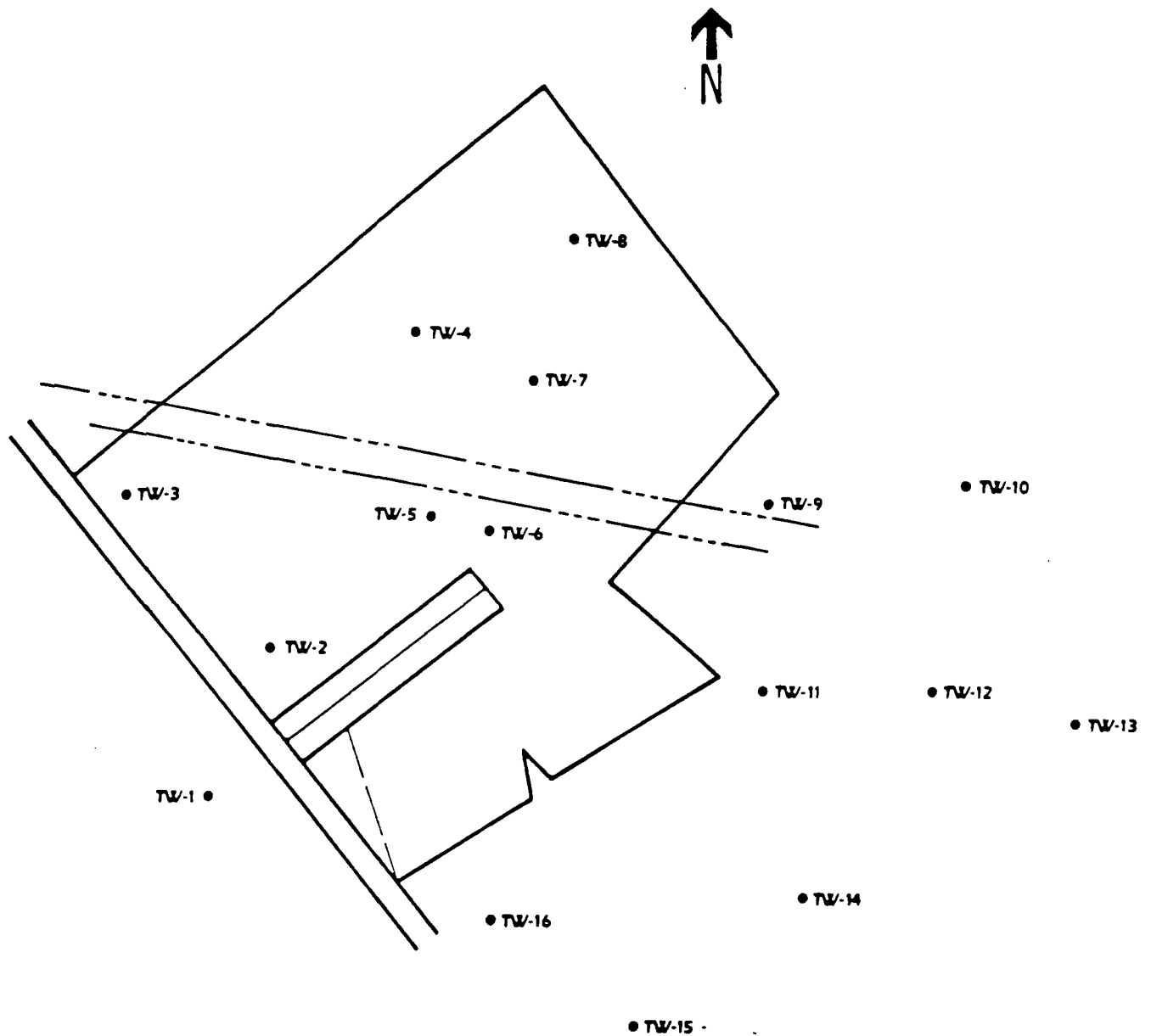
Six soil sampling locations will be required at both the lagoons to determine the hazardous nature of the filled and open lagoons (see Figure 4-1).

The material will be sampled with a stainless steel hand auger and analyzed to determine the hazardous nature of the material. Appropriate holding times for samples prior to analysis will be maintained.

4.3.9 Installation and Sampling of Temporary Wells

In addition to the 25 existing wells, 16 groundwater samples will be collected from shallow (surficial aquifer) temporary wells (see Figure 4-5) to better define the extent of the groundwater plume migrating from the site. These samples will also be analyzed by a local laboratory for quick turnaround service. The samples will be analyzed for VOC and metals. These data, combined with existing monitor well samples, will provide for more accurate placement of new permanent monitor wells.

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NOT TO SCALE

EBASCO

REM III
TEMPORARY WELL LOCATIONS
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

FIGURE

4-5

4.3.10 Soil Boring and Sampling

To further identify the vertical and lateral extent of soil contamination, 29 soil borings will be completed within and near the study area at the Bluff Road site. Preliminary locations for these borings are shown on Figure 4-1. Exact locations will be determined in the field and will be based on information generated from the site screening investigation. These borings will be completed to identify contaminant concentrations and the general subsurface conditions. Samples will be collected in selected areas of the site as follows:

- o Soil borings onsite for chemical analysis.
- o Soil borings immediately downgradient of the site for chemical analysis.
- o Soil borings immediately upgradient of the site for chemical analysis.

4.3.11 Groundwater Investigations, Including Installation, Sampling, and Slug Testing of New Permanent Monitoring Wells

Versar's review of the Golder Associates RI identified numerous data gaps and deficiencies in the groundwater monitoring investigative and methodological approach. The remedial groundwater monitoring tasks and methodology changes suggested by Versar are listed below:

- o Eliminate compositing of groundwater samples.
- o Define extent of contamination near the drainage ditch.
- o Define extent of contamination near well P-18.
- o Determine the extent of the contaminated groundwater plume.
- o Determine overall water quality.
- o Eliminate use of PVC and vyon (polyethylene) materials in well construction.

- o Determine flow direction in lower aquifer.
- o Define extent and composition of clay aquitard.

To eliminate the identified data gaps and deficiencies, approximately 17 shallow monitor wells and four deep monitor wells will be installed at and near the Bluff Road site. Figure 4-6 shows the preliminary well locations. The exact locations of the wells will be determined in the field and will be based on existing data and the data generated from the earlier screening activities. Slug tests will be performed to evaluate hydraulic conductivity of the aquifers and determine flow direction. Undisturbed soil samples will be obtained from the clay aquitard for analysis. All monitoring well construction will be stainless steel, and all groundwater samples will be analyzed by a CLP laboratory for TCL analysis.

4.3.12 Aquatic Biota Survey

The aquatic biota survey will determine the abundance and diversity of fish and benthic macroinvertebrates in the streams at the surface water sampling stations in the vicinity of the site (see Figure 4-3). The survey will be performed during the field investigation normal flow conditions. For all organisms observed, it will be determined if they are tolerant or intolerant species.

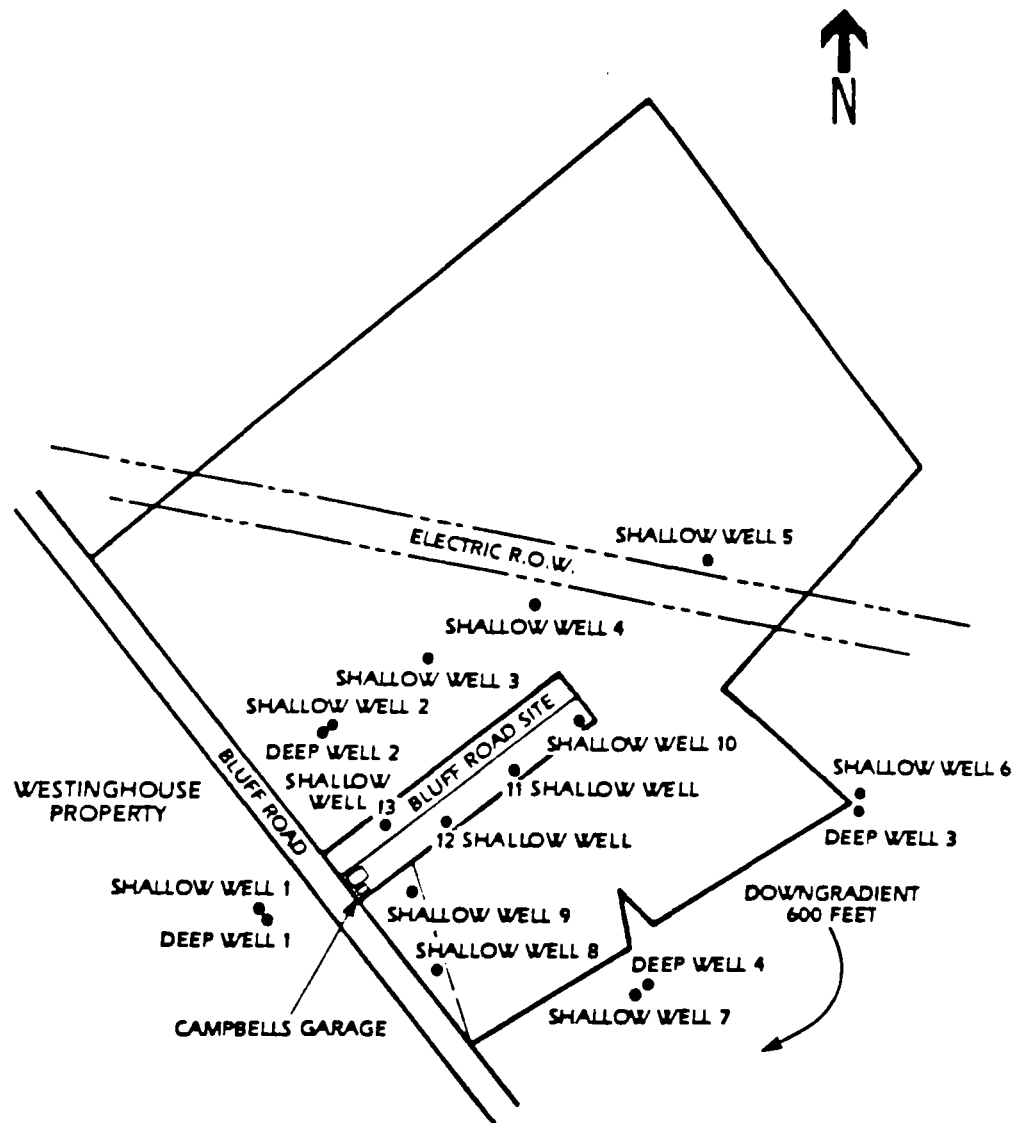
4.3.13 Abandonment of 11 Existing Monitoring Wells

The monitoring wells (W-1 to W-11) installed by SCDHEC will be located and properly abandoned because of questionable construction techniques. A survey by Golder Associates located eight of these wells, however, the remaining three should also be located, if possible, and properly abandoned.

4.3.14 Surveying

A subcontracted licensed surveyor will provide horizontal and vertical locations for all new monitor wells and locations of all soil borings. In addition, the surveyor will define the site area and provide a base map with all wells and borings located.

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NOT TO SCALE

REM III
MONITOR WELL LOCATION MAP
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

EBASCO

FIGURE

4-6

4.3.15 Onsite Tank

The onsite tank will be addressed in the FS if it is not removed as part of an expedited response action.

4.4 TASK 4 - SAMPLE ANALYSIS AND DATA VALIDATION

4.4.1 Sample Analysis

Table 4-1 identifies the media to be sampled, the number of samples of each medium, the number of associated QA/QC samples, the parameters for which the samples will be analyzed, and the laboratory at which the analyses will be carried out (CLP and/or local lab). Field analysis of pH, temperature and specific conductance will be carried out as specified in Region IV Environmental Services Division's Standard Operating Procedures (ESD SOPs).

4.4.2 Quality Control and Data Validation

Quality control (QC) during analysis through the CLP program is described by EPA's CLP Caucus for Inorganic Protocol (CLP-CIP) and Caucus for Organic Protocol (CLP-COP). Quality Control through the local laboratories is described in Appendix A of the FOP. Quality control for all other aspects of this task will be in accordance with the Region IV ESD SOPs. QC samples are included in Table 4-1.

Validation of laboratory analyses is a systematic process of reviewing a body of laboratory data to provide assurance that the data are adequate for their intended use. The process includes the following activities:

- o Verifying system calibration
- o Auditing quality control activities
- o Verifying compound identification
- o Auditing chain of custody and sample holding time
- o Checking intermediate calculations
- o Qualifying data when necessary

TABLE 4-1
SUMMARY OF SAMPLING TASKS AND RELATED QC REQUIREMENTS AND ANALYTICAL PARAMETERS
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

<u>Sampling Task</u>	<u>No. Of Samples and Media</u>	<u>No. Of Duplicate Samples</u>	<u>No. Of Field Blanks</u>	<u>No. Of Trip Blanks</u>	<u>Total No. of Samples</u>	<u>Analyses</u>	<u>Source of Analysis</u>	<u>Analytical Method</u>	<u>DQO Level of Analysis</u>
Surface Soil Samples	34-soil	3	1	1	39	Ext. org, pest, PCB, volatile organics, metals, cyanide	Local	As specified in Appendix A	III
Surface Soil Sample Splits	3-soil	1		1	5	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Existing Monitor Well Groundwater Samples	25-water	2	1	1	29	Volatile organics, metals, cyanide	Local	As specified in Appendix A	III
Existing Monitor Well Groundwater Sample Splits	2-water			1	3	Ext, org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Surface Water Samples	7-water	1	1	1	10	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Sediment Samples	7-soil	1	1	1	10	Ext. org, pest, PCB, volatile organics metals, cyanide	CLP	RAS	IV

Note: A full set of analyses will be performed as poart of the trip blank.

TABLE 4-1 (Continued)
SUMMARY OF SAMPLING TASKS AND RELATED QC REQUIREMENTS AND ANALYTICAL PARAMETERS
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

<u>Sampling Task</u>	<u>No. Of Samples and Media</u>	<u>No. Of Duplicate Samples</u>	<u>No. Of Field Blanks</u>	<u>No. Of Trip Blanks</u>	<u>Total No. of Samples</u>	<u>Analyses</u>	<u>Source of Analysis</u>	<u>Analytical Method</u>	<u>DQO Level of Analysis</u>
Lagoon Surface Water Samples	3-water		1		4	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Lagoon Sediment Samples	3-soil		1		4	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Lagoon Soil Samples	6-soil	1	1	1	9	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Groundwater Temporary Wells	16-water	1	1	1	19	Volatile organics, Local metals, cyanide		As specified in Appendix A	III
Split Spoon Samples	87-soil	9	1	1	98	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	III

*If conditions permit

Note: A full set of analyses will be performed as poart of the trip blank.

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TABLE 4-1 (Continued)
SUMMARY OF SAMPLING TASKS AND RELATED QC REQUIREMENTS AND ANALYTICAL PARAMETERS
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

<u>Sampling Task</u>	<u>No. Of Samples and Media</u>	<u>No. Of Duplicate Samples</u>	<u>No. Of Field Blanks</u>	<u>No. Of Trip Blanks</u>	<u>Total No. of Samples</u>	<u>Analyses</u>	<u>Source of Analysis</u>	<u>Analytical Method</u>	<u>DQO Level of Analysis</u>
Split Spoon Sample Splits	9-soil	1	1	1	12	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Groundwater Samples New Monitor Wells	21-water	2	1	1	26	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
*Runoff Sediment Samples	5-soil			1	6	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV

*If conditions permit

Note: A full set of analyses will be performed as part of the trip blank.

The review and validation of CLP and local laboratory data will be performed according to the current Region IV ESD QA/QC guidelines.

4.5 TASK 5 - DATA EVALUATION

The purpose of this task is to organize the validated data collected from the field and laboratories into a working format for analysis, and then perform the necessary calculations and evaluations to meet the project objectives. Task 5 has two distinct components: data reduction and data evaluation. Brief descriptions of these components follow.

4.5.1 Data Reduction

Data obtained from the various field investigations will be condensed and organized to facilitate evaluation and presentation in this subtask. Reduction of data will result in the production of various tables, figures and drawings describing and summarizing the pertinent site features. These might include:

- o Figures displaying boring and monitoring well locations
- o Various hydrogeologic cross-sections
- o Groundwater contour maps
- o Contaminant contour maps

Data reduction will be facilitated by computerization. The computerized sampling and analytical data base will be amenable to manipulation and creation of different sorting profiles. Sorting profiles will assist in evaluating the occurrence and distribution of contaminants within the different media. Appropriate tables, maps and figures will be produced to summarize the occurrence and distribution of contaminants on and migrating from the Bluff Road site.

4.5.2 Data Evaluation

Once the data are reduced to a usable format, they will be reviewed and evaluated in order to determine if the RI project objectives have been met. The data will be evaluated in such a manner as to allow a comparative evaluation of the remedial alternatives.

4.6 TASK 6 - BASELINE PUBLIC HEALTH/ENVIRONMENTAL ASSESSMENT

The baseline public health/environmental assessment will address the potential human health and environmental effects associated with the Bluff Road site under the no-action alternative. The no action alternative assumes that no remedial (corrective) action will take place at the site. Evaluation of the no-action alternative is required under Section 300.68(f)(v) of the National Contingency Plan (NCP).

There are two objectives to the baseline assessment. First, the assessment provides information that can be used to evaluate the need for remediation based on the potential health and environmental risks posed by the site and identify other exposure pathways that potentially contribute to the baseline risk. Second, the baseline assessment will provide a basis for determining the reduction in potential environmental exposure resulting from the different remedial actions to be evaluated in the feasibility study and thus provide part of the basis for selecting a remedial alternative for the site.

The main steps in this assessment will be performed in accordance with the latest EPA policy and guidance on risk assessments in general and for Superfund sites in particular. These steps are:

- o Baseline Site Assessment;
- o Exposure Assessment;
- o Environmental Assessment; and
- o Comparison of Environmental considerations with ARARs.

4.6.1 Baseline Site Assessment

After completion of the RI effort, the chemical data will be compiled and reviewed. A list of compounds of concern will then be prepared. Toxicology data on the identified contaminants will be gathered from EPA sources and other literature. Whenever reference doses (Rfd), potency factors, or other toxicological information have been published by the EPA, these parameters will be used. In the absence of published EPA information, the available literature will be consulted for toxicological information.

Indicator compounds will then be selected from the list of compounds of concern. The information to be used in this selection will be toxicological data, contaminant concentrations, and chemical characteristics. The indicator chemicals will be selected according to toxicity, environmental concentration, available toxicological information, and contaminant class representativeness. The indicator compounds will then be used in the exposure assessment.

4.6.2 Exposure Assessment

The previously suggested exposure routes (see Section 3.1) will be reexamined in light of the RI data. Exposure point concentrations will be documented by using actual measurements, by modeling, or by interpolation. The methods of modeling or interpolation cannot be identified at this time, because of the uncertainty of compound distribution in the site media. If modeling is necessary, the models will be selected from available literature (i.e., EPA publications and reviewed journals). All models and assumptions will be documented in the report and supplemented with appendices as appropriate.

Chemical intakes for each human exposure scenario will be estimated based on frequency and duration of exposure and rate of media intake (e.g., amount of water ingested per day). Human exposure is expressed in terms of intake which is the amount of a substance taken into the body per unit body weight per unit time. A chronic daily intake (CDI) is averaged over a lifetime for carcinogens and over the exposure period for noncarcinogens. The CDI is calculated separately for each exposure pathway, since different populations-at-risk may be affected by the individual pathways. The assumptions used in this risk assessment will be selected to represent an "average exposure case" and a "plausible maximum case".

The exposure assessment will use simple models to estimate the risk or hazard index from the previously developed pathway exposure levels or body burden. Since estimates or results from models will be used to define the body burden and no one single value is the "right one", a range of values will be produced. A series of distributions will be formulated to represent these ranges. For example, not everyone will be exposed exactly for 30 years, but a range of 10 to 50 years might be appropriate. Another example is that instead of being exposed to 30 mg/kg/day, the person is exposed to 0.5 to 100 mg/kg/day. These parameter

distributions will be used in a computer program developed by Ebasco to estimate the probability of risk by a random Latin Hyper-Cube sampling procedure. The results will be expressed as the medium estimate and associated range. A realistic appraisal of the risk associated with exposure to the contaminants at the Bluff Road site can then be made.

4.6.3 Environmental Assessment

Site chemical data, exposure point estimates, and biological monitoring data will be evaluated with respect to the potential environmental effects of site contaminants. The flora and fauna of the site will be included in this assessment. The type of flora and fauna to be considered will be developed by direct observation and contrasted with the most probable species to be present given the site location and history. The environmental assessment will be limited in scope and a full modeling and speciation count will not be attempted.

4.6.4 ARAR Comparison

In addition to critical toxicity values, any applicable or relevant and appropriate requirements (ARARs) that have been identified by the state of South Carolina will be used to evaluate the site. The ARARs will be compared to the exposure point estimates previously developed to determine applicability of remedial actions. Specifically, the potential of the no action alternative will be discussed. Currently, the EPA considers maximum contaminant levels (MCLs) developed under the Safe Drinking Water Act, Federal Ambient Water Quality Criteria (AWQC), National Ambient Air Quality Standards (NASQS), and state environmental laws to represent potential ARARs for use in risk assessment at Superfund sites. ARARs are discussed in Section 3.2 of this Work Plan.

4.7 TASK 7 - TREATABILITY STUDY/PILOT TESTING

As part of the Golder RI, laboratory treatability studies were conducted on soil and groundwater samples collected at the Bluff Road Site. The specific tests conducted were as follows:

- 1) Soil leachability study;
- 2) Volatile Organics Stripping for ground water; and
- 3) Soil Aeration.

The soil leachability and groundwater stripping studies concluded that volatile organic contamination could be removed utilizing these technologies. The studies also concluded that these methods are viable remedial alternatives at the Bluff Road Site. However, further study was recommended.

The soil aeration study was not completed due to the curtailment of the project.

During the RI, samples of the soil and groundwater will be analyzed for physical as well as chemical characteristics. The test results will be evaluated to determine the feasibility of the technologies being screened.

The evaluation of RI data may indicate that other specific treatability/compatibility testing may be required in addition to this physical/chemical data, for evaluation of technologies. These studies would be conducted as part of the RI. Treatability studies may be necessary to fully evaluate the feasibility of the technologies.

If evaluation of RI data indicates site-specific treatability/compatibility studies, or other pilot testing are necessary to complete the FS, an Engineering Evaluation and Cost Analysis for these activities will be prepared for review and approval by the EPA.

4.8 TASK 8 - REMEDIAL INVESTIGATION REPORT

The Remedial Investigation report task includes all work efforts related to the documentation of the results once the data have been evaluated and the risk assessment performed. This task covers both the draft and final remedial investigation report.

4.8.1 Draft Report Preparation

Following completion of the data evaluation and risk assessment tasks, a draft Remedial Investigation report will be prepared for submission to the EPA. The report will address the following:

- o Soil quality data
- o Surface water and sediment quality data
- o Groundwater quality data
- o Monitor well construction comparison results
- o Site-specific hydrogeologic data
- o Contaminant source and migration evaluation results
- o Risk assessment results
- o Conclusions and recommendations

4.8.2 Graphics Preparation

This subtask includes the preparation of all graphics to be included in or with both the draft and final Remedial Investigation report. These graphics may include but are not limited to:

- o Site maps
- o Contour maps
- o Plume diagrams
- o Hydrogeologic cross-sections
- o Well location maps
- o Sampling location maps

4.8.3 Draft Report Printing/Distribution

This subtask includes all work efforts associated with reproducing and distributing the draft remedial investigation report to the appropriate review parties, as directed by the EPA. No more than 15 copies are anticipated.

4.8.4 Review Meeting

A review meeting will be held with representatives from all the appropriate review agencies and parties to discuss comments addressing the results, conclusions, and recommendations in the draft Remedial Investigation report. After completion of the meeting, minutes will be prepared and distributed to all review meeting participants. In addition, a follow-up memorandum addressing all comments submitted in writing by the review meeting participants will be prepared and submitted to the EPA.

4.8.5 Final Report Preparation

After the EPA and other agencies review the draft Remedial Investigation report, a final Remedial Investigation report will be prepared for submission to the EPA. All appropriate comments generated by the review participants will be incorporated in the final report.

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4.8.6 Final Report

This subtask includes all work efforts associated with reproducing and distributing the final Remedial Investigation report to the appropriate parties, as directed by the EPA. No more than 30 copies are anticipated.

This subtask also includes participation in a public meeting to present the RI findings. Additional post RI and FS activities will be conducted under Task 12 (Section 5.4).

5.0 TASK PLAN FOR THE FEASIBILITY STUDY

The completion of the following tasks will be necessary in order to complete a Feasibility Study (FS) for the Bluff Road Site. Golder Associates did not submit a FS as part of the RI report. Therefore, all steps of the FS are yet to be conducted. It should be noted, however, that some treatability studies were conducted as part of the previous Golder RI (see Section 4.7). All usable information on the results of these studies will be incorporated into the FS.

The Feasibility Study will consist of the following five standard FS tasks:

- o Task 9 - Remedial Alternatives Screening,
- o Task 10 - Remedial Alternatives Evaluation,
- o Task 11 - Feasibility Study Report,
- o Task 12 - Post RI/FS Support, and
- o Task 15 - EPA Planning (see Section 3.3.4)

Tasks 9, 10, and 15 will be initiated as early in the RI/FS process as possible. Many activities will be performed concurrently rather than sequentially among these tasks in order to expedite the FS process. The approach taken in the FS will follow the EPA guidance document, "Guidance on Feasibility Studies under CERCLA" and the Section 121 provisions of SARA. The overall objective of the FS will be to determine an appropriate remedial action (or actions) for known contaminated locations.

In developing and evaluating potential remedial actions, consideration will be given to the following factors:

- o Compliance with ARARs;
- o Reduction of toxicity, mobility and volume;
- o Short-term effectiveness;
- o Long-term effectiveness and permanence;

- o Implementability;
- o Cost;
- o Community reaction;
- o State acceptance; and
- o Overall protection of human health and the environment.

5.1 TASK 9 - REMEDIAL ALTERNATIVES SCREENING

In this task, remedial alternatives will be screened as the first step in the FS process. This task will employ data collected in the RI Field Investigation (Task 3) and Risk Assessment (Task 6). The subtasks comprising Task 9 will accomplish the following objectives:

- o Refine the preliminary remedial objectives identified during the scoping process (see Section 3.3) under Task 1 and finalize the objectives;
- o Refine the preliminary remedial technologies identified during the scoping process (see Section 3.3) under Task 1, finalize the list of applicable remedial technologies and assembly of alternatives; and
- o Screen remedial technologies/alternatives.

5.1.1 Development of Remedial Response Objectives

Based on the results of the RI, the nature and extent of the problem at the site will be defined. This definition will include types of contamination at the site, the source of the contamination, migration pathways of concern at the site, and potential receptors at or near the site. Any changes to the original description of the nature and extent of the problem at the site included in the RI Work Plan will be discussed and justified based on results of the remedial investigation.

Following this summary of the current situation, a site-specific statement of purpose for the response, based on the results of the remedial investigation, will be developed. The statement of

purpose will identify the actual or potential exposure pathways that should be addressed by remedial alternatives. The statement of purpose will also finalize the site-specific remedial response objectives identified in Section 3.3 and establish criteria for the development and evaluation of alternatives.

These remedial response objectives shall be based on public health and environmental concerns, information gathered during the remedial investigation, CERCLA as amended by SARA, the National Contingency Plan (NCP) and any amendment thereto, EPA guidance, 40 CFR 264 (RCRA), Federal and State water quality standards including narrative toxicity standards, and the requirements of any other applicable or relevant and appropriate federal or state requirement (ARARs), standard, criteria, limitation, or statutes.

5.1.2 Identification of Applicable Technologies and Assembly of Alternatives

Based on the site-specific problems and statement of purpose developed under Section 5.1.1, a specific list of potentially feasible remedial technologies will be developed. These remedial technologies will include both onsite and offsite remedies, depending on site problems. The specific list will be developed from a general list by screening technologies based on site conditions, waste characteristics, and technical requirements in order to eliminate or modify those technologies that may prove extremely difficult to implement, will require unreasonable time periods, or will rely on insufficiently developed technology.

5.1.2.1 Identification of General Response Actions

Using the definition of the nature and extent of the problems as a guide, the list of general response actions found in Table 3-3 (Section 3.3) will be reviewed and those actions which are applicable to site problems identified.

5.1.2.2 Identification of Specific Remedial Technologies

For each general response action identified as being applicable to site problems, the specific remedial technologies associated with it will be reviewed for suitability to remedy site problems. The typical remedial technologies associated with general response actions were listed on Table 3-4 (Section 3.3). A more extensive list of remedial technologies is included in Appendix A.

The review of remedial technologies will identify specifically to which portion of the site problem each remedial technology is applicable and the degree to which it will mitigate the problem. Also, any site characteristics or waste characteristics that might alter the effectiveness of a remedial technology at the Bluff Road Site will be noted. Table 3-5 (Section 3.3) lists some of the site and waste characteristics to be considered.

5.1.2.3 Development of Alternatives

Given the final remedial response objectives developed earlier (Section 5.1.1), the applicable remedial technologies will be combined to form remedial action alternatives for the site. These alternatives will address site problems by controlling the source of contaminants, managing the migration of contaminants, or both.

To the extent that it is both feasible and appropriate, treatment alternatives for source control actions will be developed ranging from an alternative that would eliminate the need for long-term management (including monitoring) at the site, to an alternative using, as a principal element, treatment that would reduce the toxicity, mobility, or volume of site waste. An alternative involving treatment as a principal element is one that uses treatment technologies to reduce the principal threats posed by the site. A number of alternatives within the above range will be considered for the site.

In addition, groundwater treatment alternatives for managing migration of contaminants will be developed over a performance range that is defined in terms of a remediation level within the probability range of 10^{-4} to 10^{-7} for maximum lifetime risk and including different rates of restoration. If feasible, one alternative will be configured that will restore ground water to a 10^{-6} probability level for maximum lifetime risk within five years.

5.1.3 Screening of Remedial Technologies/Alternatives

The alternatives developed under Section 5.1.2 will be screened to eliminate those that are clearly infeasible or inappropriate. This initial screening will be conducted prior to undertaking detailed evaluations of the remaining alternatives. The purpose of the screening step is to reduce the number of alternatives requiring detailed analysis while preserving a range of options.

This screening is accomplished by considering the public health effects, environmental impacts, technical feasibility, and cost of each alternative relative to the other alternatives. Specifically the factors to be considered in each area are as follows:

- 1) Public Health Effects: Only those alternatives that satisfy the response objectives and contribute substantially to the protection of public health, welfare, or the environment will be considered further. Source control alternatives will achieve adequate control of source materials. Management of migration alternatives will minimize or mitigate the threat of harm posed by the contaminants at the site to public health, welfare, or the environment;
- 2) Environmental Effects: Alternatives posing significant adverse environmental effects will be excluded;
- 3) Technical Feasibility: Technologies that may prove extremely difficult to implement, will not achieve the remedial objectives in a reasonable time period, or will rely upon unproven technology will be modified or eliminated. If there is reasonable belief that an innovative technology offers potential for better treatment performance or implementability, fewer or lesser adverse impacts than other available approaches, or lower costs than demonstrated technologies, then it should be carried through this screening; and
- 4) Cost: An alternative whose cost far exceeds that of other alternatives which provide similar results will usually be eliminated unless other significant benefits may also be realized. (Note that cost may be compared among treatment alternatives, but not between treatment and non-treatment alternatives) Total costs will include the cost of implementing the alternatives and the cost of operation and maintenance.

The cost screening will be conducted only after the environmental, public health, and technical screenings have been performed.

In some situations the above factors could occasionally result in elimination of alternatives which involve treatment of the source as the principal element. Upon completion of the screening, the six alternatives found to be most feasible will be presented to the EPA in a technical memorandum.

Documentation for this screening process will be provided in the FS report. The rationale for elimination of any alternatives will be presented in detail. Those alternatives that pass the initial screening in Task 9 will be carried forward for detailed evaluation in Task 10.

5.2 TASK 10 - REMEDIAL ALTERNATIVES EVALUATION

The alternatives passing through the initial screening will be analyzed in further detail against a range of factors and compared against one another.

The effectiveness of the alternatives will be assessed, taking into account whether or not (1) an alternative adequately protects human health and the environment and attains Federal and State ARARs, (2) whether or not it significantly and permanently reduces the toxicity, mobility, or volume of hazardous constituents, and (3) whether or not it is technically reliable.

Alternatives will be evaluated against implementability factors, including (1) the technical feasibility and availability of the technologies each alternative would employ, (2) the technical and institutional ability to monitor, maintain, and replace technologies over time, and (3) the administrative feasibility of implementing the alternative.

Finally, the costs of construction and the long-term costs of operating and maintaining the alternatives will be analyzed using present-worth analysis.

Both the short- and long-term effects of each of these factors will be assessed. In considering these items, all of the long-term effectiveness factors cited in SARA Sec. 121 (b) (1) will be addressed. After each alternative has been analyzed against these factors, the remedial options will be compared for their relative strengths and weaknesses.

The detailed evaluation will include, at a minimum, the following specific analyses:

5.2.1 Technical Analysis

The technical analysis will include, as a minimum:

- 1) A description of appropriate treatment and disposal technologies including the intent of the remedial alternative (e.g., source control or management of migration);
- 2) Special engineering considerations required to implement the alternatives (e.g., pilot treatment facility, additional studies needed to proceed with final remedial design);
- 3) Discussions of how the alternative does (or does not) comply with specific requirements of other environmental programs. When an alternative does not comply, a discussion of how the alternative prevents or minimizes the migration of wastes and public health or environmental impacts and a description of special design needs that could be implemented to achieve compliance;
- 4) Operation, maintenance, and monitoring requirements of the remedy;
- 5) Identification and review of potential offsite facilities to ensure compliance with applicable RCRA, and other EPA environmental program requirements, both current and proposed. Potential disposal facilities will be evaluated to determine whether offsite management of site wastes could result in a potential for a future release from the disposal facility;
- 6) Temporary storage requirements;
- 7) Safety requirements for remedial implementation (including both onsite and offsite health and safety considerations);

- 8) A description of how the alternatives could be phased into operable units. The description includes a discussion of how various operable units of the total remedy could be implemented individually or in groups, resulting in a significant improvement in the quality of the environment or savings in cost;
- 9) A description of how the alternatives could be segmented into areas to allow implementation of different phases of the alternative;
- 10) An assessment of local residents' perception of the impact of the alternative;
- 11) Aspects of the site conditions that the alternative will or will not control;
- 12) The performance of a remedial alternative based on its effectiveness and useful life. Effectiveness refers to the degree to which an action prevents or minimizes substantial danger to public health, welfare, or the environment. This is usually accomplished via certain functions (i.e., containment, diversion, removal, destruction, or treatment). The effectiveness of an alternative should be determined either through design specifications or by performance evaluation. The useful life of an alternative is the length of time this level of effectiveness can be maintained. Each alternative will be evaluated in terms of the projected service lives of its component technologies;
- 13) The reliability of a remedial alternative which includes its operation and maintenance requirements and demonstrated reliability at similar sites. Operation and maintenance (O&M) requirements should be assessed by the availability and cost of necessary labor and materials, and by the frequency and complexity of O&M activities. The demonstrated performance of an alternative should include an estimate of the probability of failure in qualitative or quantitative terms for each component technology and for the complete alternative. Although preference will be given to technologies previously

demonstrated under similar site and waste conditions, innovative or developmental technologies may be evaluated as an alternative. Their evaluation may be based on bench scale tests completed during the RI, if appropriate, and researchers' laboratory and field tests;

- 14) An analysis of whether recycle/reuse, waste minimization, waste biodegradation, waste destruction, or other advanced, innovative, or alternative technologies are appropriate to reliably minimize present or future threats to public health, welfare, and the environment;
- 15) Safety criteria such as the security and freedom from risk, loss, injury, harm, and danger. Each remedial action alternative will be evaluated with regard to safety. Factors to be considered in this evaluation will include short- and long-term threats to the safety of the remedial workers, the community living and working in the site vicinity and the environment and facilities during implementation of the remedial measures; and
- 16) An analysis of agencies which can provide valuable assistance in the implementation of an alternative. All agencies with which consultations will be needed will thus be listed. A partial list may include the:
 - U.S. Dept. of Commerce (NOAA),
 - National Park Service,
 - Federal Emergency Management Agency,
 - Department of Health and Human Services,
 - U.S. Army Corps of Engineers,
 - U.S. Geological Survey,
 - Occupational Safety and Health Administration, and
 - U.S. Department of Interior (U.S. Fish & Wildlife Service).

5.2.2 Environmental Analysis

The environmental analysis will at a minimum involve performing an Environmental Assessment (EA) for each alternative. The EA should focus on the site problems and pathways of contamination actually addressed by each alternative. The EA for each

alternative will include, at a minimum, an evaluation of beneficial effects of the response, adverse effects of the response, and an analysis of measures to mitigate adverse effects. The no-action alternative will be fully evaluated to describe the current site situation and anticipated environmental conditions if no actions are taken. The no-action alternative will serve as the baseline for the analysis.

5.2.3 Institutional Analysis

The institutional analysis will at a minimum involve evaluating each alternative based on its relevant institutional needs. Specifically, regulatory requirements, permits, community relations, and participating agency coordination will be assessed.

5.2.4 Public Health Analysis

The public health analysis will involve evaluating each alternative in terms of the extent to which it will mitigate damage to public health in comparison to the other remedial alternatives.

The public health analysis consists of a baseline site assessment, an exposure assessment, and a comparison of environmental considerations to relevant and applicable standards. First, a baseline site evaluation is conducted where all data on the extent of contamination, contaminant mobility and migration, and types of alternatives are reviewed. The result of the baseline evaluation is the determination of data required to conduct an exposure assessment and the level of detail in this assessment.

Second, an exposure assessment will be conducted. A qualitative exposure assessment is required for source control actions to evaluate the types, amounts, and concentrations of chemicals at the site, their toxic effects, the proximity of target populations, the likelihood of chemical release and migration from the site, and the potential for exposure. A quantitative exposure assessment is conducted for management of migration actions to estimate the frequency, magnitude, and duration of human exposure to toxic chemical contaminants released from a site.

Following the exposure assessment, estimated environmental concentrations of the indicator chemicals selected for the site (if there are a large number of chemicals present) will be compared to applicable or relevant environmental standards such as those found in RCRA regulations, National Interim Primary Drinking Water Standards, Maximum Contaminant Levels, National Ambient Air Quality Standards, EPA and State water quality standards including narrative toxicity standards, as well as EPA criteria for noncarcinogens, carcinogens, and health advisories. When no applicable standard exists, at least one alternative should be aimed at a 10^{-6} lifetime health risk level, and other alternatives in the 10^{-4} to 10^{-7} lifetime health risk level.

5.2.5 Cost Analysis

The cost of each feasible remedial action alternative remaining after initial screening will be evaluated and will include each phase or segment of the alternative and consider cost and non-cost (i.e., loss of natural resources) criteria. The cost of each alternative will be presented as a present worth cost and includes the total cost of implementing the alternative and the annual operating and maintenance cost of implementing the alternative. A distribution of costs over time will also be provided. A table showing the above cost information for each alternative will be included.

In developing detailed cost estimates, the following steps will be performed:

- 1) Estimation of Costs: Determine capital and annual operating costs for remedial alternatives;
- 2) Cost Analysis: Using estimated costs, calculate the stream of payments and present worth for each remedial alternative; and
- 3) Sensitivity Analysis: Evaluate risks and uncertainties in cost estimates; cost estimates should be within +50% and -30% of the actual cost.

5.2.6 Summary of Alternatives

Using a comparative format, the results of the detailed technical, institutional, public health, and environmental

evaluations of each alternative will be summarized. At a minimum, the following areas will be used to compare alternatives:

- 1) Present Worth of Total Costs: The net present value of capital, operating, and maintenance costs will be presented;
- 2) Health Information: For the no-action alternative, a quantitative statement including a range estimate of maximum individual risks will be prepared. If quantification is not possible, a qualitative analysis will be prepared. For source control options, a quantitative risk assessment will not be prepared. For management of migration measures, a quantitative risk assessment including a range estimate of maximum individual risks will be prepared;
- 3) Environmental Effects: Only the most important effects or impacts will be summarized. Reference will be made to supplemental information arrayed in a separate table, if necessary;
- 4) Technical Aspects of the Remedial Alternatives: The technical aspects of each remedial alternative relative to the others will be clearly delineated. The information generally will be based on the professional opinion of the engineer regarding the site and the technologies comprising the remedial alternative;
- 5) Information on the Extent to Which Remedial Alternatives Meet the Technical Requirements and Environmental Standards of Applicable Environmental Regulations: This information will be arrayed so that differences in how remedial alternatives satisfy such standards are readily apparent. The general types of standards that could be applicable at the site include:
 - RCRA design and operating standards; and
 - EPA and State drinking water standards and criteria, including narrative toxicity standards;

- 6) Information on Community Effects: The type of information that will be provided is the extent to which implementation of a remedial alternative disrupts the community (e.g., traffic, temporary health risks, and relocation); and
- 7) Other Factors: This category of information will include such things as institutional factors that may inhibit implementing a remedial alternative and any other site-specific factors identified in the course of the detailed analysis that may influence which alternative is eventually selected.

5.3 TASK 11 - FEASIBILITY STUDY REPORT

Task 11 will consist of the following subtasks:

- o Summarize each alternative in terms of detailed technology, reliability, implementability, public health, environment, institutional requirements, and cost evaluation;
- o Compare the remedial alternatives;
- o Prepare the FS Report.

The FS Report will include an executive summary, an introduction and a description of the screening and evaluation process.

The FS report will include a summary of the detailed technical and cost evaluations and a comparative evaluation of the remedial alternatives. This summary will be presented as table matrices. Backup information will be included as appendices. A proposed FS Report outline is presented in Table 5-1.

5.4 TASK 12 - POST RI/FS SUPPORT

The PRPs will provide support to EPA for any requested assistance in activities that occur after the Bluff Road site RI/FS is completed. The scope for this effort, if needed, will be determined in meetings with EPA after the RI/FS report is approved and support activities identified.

TABLE 5-1
EXAMPLE FEASIBILITY STUDY REPORT FORMAT

Executive Summary

1.0 INTRODUCTION

2.0 PUBLIC HEALTH EVALUATION

3.0 OBJECTIVES OF REMEDIAL TECHNOLOGIES

4.0 SCREENING OF REMEDIAL ACTION TECHNOLOGIES

5.0 ASSEMBLY AND SCREENING OF REMEDIAL ACTION ALTERNATIVES
DEVELOPED

5.1 ENVIRONMENTAL AND PUBLIC HEALTH CRITERIA

5.2 COST CRITERIA

6.0 DESCRIPTION OF REMEDIAL ACTION ALTERNATIVES

7.0 DETAILED EVALUATION OF REMEDIAL ACTION ALTERNATIVES

7.1 TECHNICAL ANALYSIS OF ALTERNATIVES

7.2 ENVIRONMENTAL EVALUATION OF ALTERNATIVES

7.3 INSTITUTIONAL REQUIREMENTS EVALUATION

7.4 PUBLIC HEALTH EVALUATION OF ALTERNATIVES

8.0 SUMMARY OF ALTERNATIVES

REFERENCES

APPENDIX

A ARARs

B RISK ASSESSMENT

C DETAILED COST ANALYSIS

10 11 0160

5.5 TASK 15 - ERA PLANNING

An above ground tank currently remains on the Bluff Road site. The Golder RI report indicated that this tank contains sludge that is highly contaminated with 2-chlorophenol and phenol. Ebasco believes that an Expedited Response Action (ERA) directed toward remediation of this tank may be warranted.

Two PRPs will evaluate the current situation regarding the tank, utilizing information from previous studies, and provide an Engineering Evaluation and Cost Analysis describing the type and extent of an ERA that could be implemented. This will be provided within 30 days of approval of the Final Work Plan.

The need for any additional sampling of the tank will be discussed in the EE/CA. If the EPA does not elect to conduct an expedited tank response action, the tank will be addressed during the Feasibility Study as described in Sections 5.1 through 5.4 above.

6.0 PROJECT MANAGEMENT APPROACH

6.1 QUALITY ASSURANCE AND DATA MANAGEMENT

The site-specific quality assurance requirements will be in accordance with the Region IV ESD SOPs. The ESD SOPs provide general guidance on several subjects including QA objectives for measurement of data in terms of precision, accuracy, representativeness, completeness, and comparability.

Data management aspects of the program pertain to controlling and filing documents. The PRPs will develop a program filing system that conforms to the requirements of the EPA to ensure that the integrity of the documents is safeguarded. The program will be implemented to control and file all documents associated with the Bluff Road RI/FS. The system will include document receipt control procedures, a file review and inspection system, and security measures to be followed.

6.2 PROJECT SCHEDULE

A detailed schedule of tasks and activities for the Bluff Road RI/FS will be preparedd by the PRPs and submitted to EPA for approval of field investigations.

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APPENDIX A - REMEDIAL TECHNOLOGIES

A. Air Pollution Controls

- o Capping
 - Synthetic membranes
 - Clay
 - Asphalt
 - Multimedia cap
 - Concrete
 - Chemical sealants/stabilizers
- o Dust Control Measures
 - Polymers
 - Water

B. Surface Water Controls

- o Capping (see A.)
- o Grading
 - Scarification
 - Tracking
 - Contour furrowing
- o Revegetation
 - Grasses
 - Legumes
 - Shrubs
 - Trees, conifers
 - Trees, hardwoods
- o Diversion and Collection Systems
 - Dikes and berms
 - Ditches and trenches
 - Terraces and benches
 - Chutes and downpipes
 - Seepage basins
 - Sedimentation basins and ponds
 - Levees
 - Addition of freeboard
 - Floodwalls

C. Leachate and Groundwater Controls

- o Capping (see A.)
- o Containment barriers

Function options

- Downgradient placement
- Upgradient placement
- Circumferential placement

Material and construction options (vertical barriers)

- Soil-bentonite slurry wall
- Cement-bentonite slurry wall
- Vibrating beam
- Grout curtains
- Steel sheet piling

Horizontal barriers (bottom sealing)

- Block displacement
- Grout injection

- o Groundwater pumping (generally used with capping and treatment)

Function options

- Extraction and injection
- Extraction alone
- Injection alone

Equipment and Material Options

- Well points
- Deep wells
- Suction wells
- Ejector wells

- o Subsurface Collection Drains

- French drains
- Tile drains
- Pipe drains (dual media drains)

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D. Gas Migration Controls (generally used with treatment)

- o Capping (gas barriers) (see A.)
- o Gas Collection and/or Recovery
 - Passive pipe vents
 - Passive trench vents
 - Active gas collection systems

E. Excavation and Removal of Waste and Soil

- o Excavation and Removal
 - Backhoe
 - Cranes and attachments
 - Front end loaders
 - Scrapers
 - Pumps
 - Industrial vacuums
 - Drum grapplers
 - Forklifts and attachments
- o Grading (see B.)
- o Capping (see A.)
- o Revegetation (see B.)

F. Removal and Containment of Contaminated Sediments

- o Sediment removal
 - Mechanical dredging
 - Clamshell
 - Dragline
 - Backhoe
 - Hydraulic dredging
 - Plain suction
 - Cutterhead
 - Dustpan

Pneumatic dredging

- Airlift
- Pneuma
- Oozer

o Sediment turbidity controls and containment

- Curtain barriers
- Cofferdams
- Pneumatic barriers
- Capping

G. In-situ Treatment

- o Hydrolysis
- o Oxidation
- o Reduction
- o Soil aeration
- o Solvent flushing
- o Neutralization
- o Polymerization
- o Sulfide precipitation
- o Bioreclamation
- o Permeable treatment beds
- o Chemical dechlorination

H. Direct Waste Treatment

- o Incineration
 - Rotary kiln
 - Fluidized bed
 - Multiple hearth
 - Liquid injection
 - Molten salt
 - High temperature fluid wall
 - Plasma arc pyrolysis
 - Cement kiln
 - Pyrolysis/starved combustion
 - Wet air oxidation
 - Industrial boiler or furnace

o Gaseous waste treatment

- Activated carbon
- Flares
- Afterburners

o Treatment of aqueous and liquid waste streams

Biological treatment

- Activated sludge
- Trickling filters
- Aerated lagoons
- Waste stabilization ponds
- Rotating biological disks
- Fluidized bed bioreactors

Chemical treatment

- Neutralization
- Precipitation
- Oxidation
- Hydrolysis
- Reduction
- Chemical dechlorination
- Ultraviolet/ozonation

Physical treatment

- Flow equalization
- Flocculation
- Sedimentation
- Activated carbon
- Kleensorb
- Ion exchange
- Reverse osmosis
- Liquid-liquid extraction
- Oil-water separator
- Steam distillation
- Air stripping
- Steam stripping
- Filtration
- Dissolved air flotation

Discharge to a publicly owned treatment works

o Solids handling and treatment

Dewatering

- Screens, hydraulic classifiers, scalpers
- Centrifuges
- Gravity thickening
- Flocculation, sedimentation
- Belt filter presses
- Filter presses
- Drying or dewatering beds
- Vacuum-assisted drying beds

Treatment

- Neutralization
- Solvent
- Oxidation
- Reduction
- Compositing

o Solidification, stabilization, or fixation

- Cement-based
- Lime-based
- Thermoplastic
- Organic polymer
- Self-cementing techniques
- Surface encapsulation
- Classification
- Solidification (i.e., to fly ash; polymer, sawdust)

I. Land Disposal Storage

- o Landfills
- o Surface impoundments
- o Land application
- o Waste piles
- o Deep well injection
- o Temporary storage

J. Contaminated Water Supplies and Sewer Lines

- o In-situ cleaning

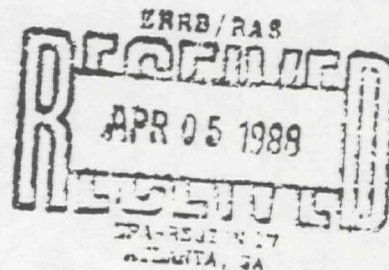
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- o Removal and replacement
- o Alternative drinking water supplies
 - Cisterns or tanks
 - Deeper or upgradient wells
 - Municipal water systems
 - Relocation of intake
- o Individual treatment units

10 11 0170

EPA WORK ASSIGNMENT NUMBER 189-4L15
UNDER
CONTRACT NUMBER 68-01-7250

FIELD OPERATIONS PLAN
BLUFF ROAD SITE
RICHLAND COUNTY, SOUTH CAROLINA
MARCH 1988



NOTICE

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FIELD OPERATIONS PLAN

BLUFF ROAD SITE
RICHLAND COUNTY, SOUTH CAROLINA

PART A - FIELD SAMPLING AND ANALYSIS PLAN

PART B - HEALTH AND SAFETY PLAN

10 11 0172

EPA WORK ASSIGNMENT NUMBER 189-4L15
UNDER
CONTRACT NUMBER 68-01-7250

FIELD SAMPLING AND ANALYSIS PLAN

BLUFF ROAD SITE
RICHLAND COUNTY, SOUTH CAROLINA

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APPROVED BY:

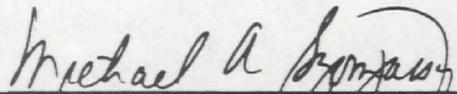

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APPENDIX A - SPECIFICATIONS FOR LEVEL III LABORATORY
ANALYSIS SAMPLE IDENTIFICATION AND
CHAIN OF CUSTODY

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1.0 INTRODUCTION

This Field Sampling and Analysis Plan (FSAP) for the Bluff Road Site, Richland County, South Carolina, is an integral part of the Remedial Investigation/Feasibility Study (RI/FS) work plan. Whereas the work plan develops the RI/FS objectives and scope and defines what activities will occur, the FSAP concentrates on how the various field activities will be performed and provides detailed sampling and quality assurance/quality control (QA/QC) procedures for sample collection, handling, and shipping.

1.1 SITE LOCATION

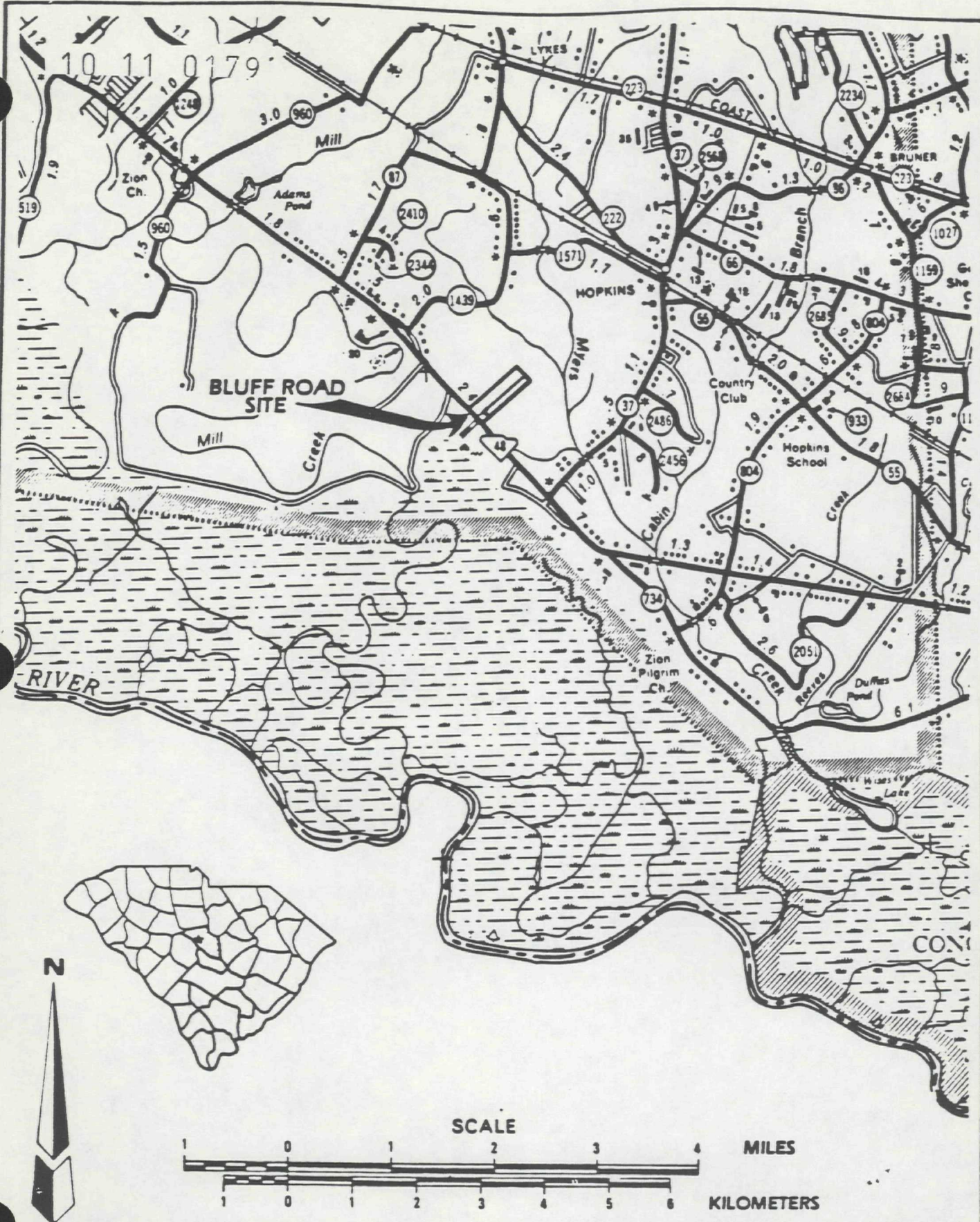
The Bluff Road Site, alternately referred to as South Carolina Recycling and Disposal, Inc. (SCRDI) is located on South Carolina Highway 48, approximately 10 miles southeast of Columbia, and 10 miles northwest of Gadsden in Richland County (Figure 1). The site is bordered by South Carolina Highway 48, also known as Bluff Road, on the southwest side. The rest of the site is surrounded by a sparsely populated rural setting. The Bluff Road site is sited adjacent to a parcel of property known as Campbell's Garage. This property and the buildings located on it are now abandoned. During previous drum removal activities, part of this site was used as a drum staging area.

1.2 SITE HISTORY

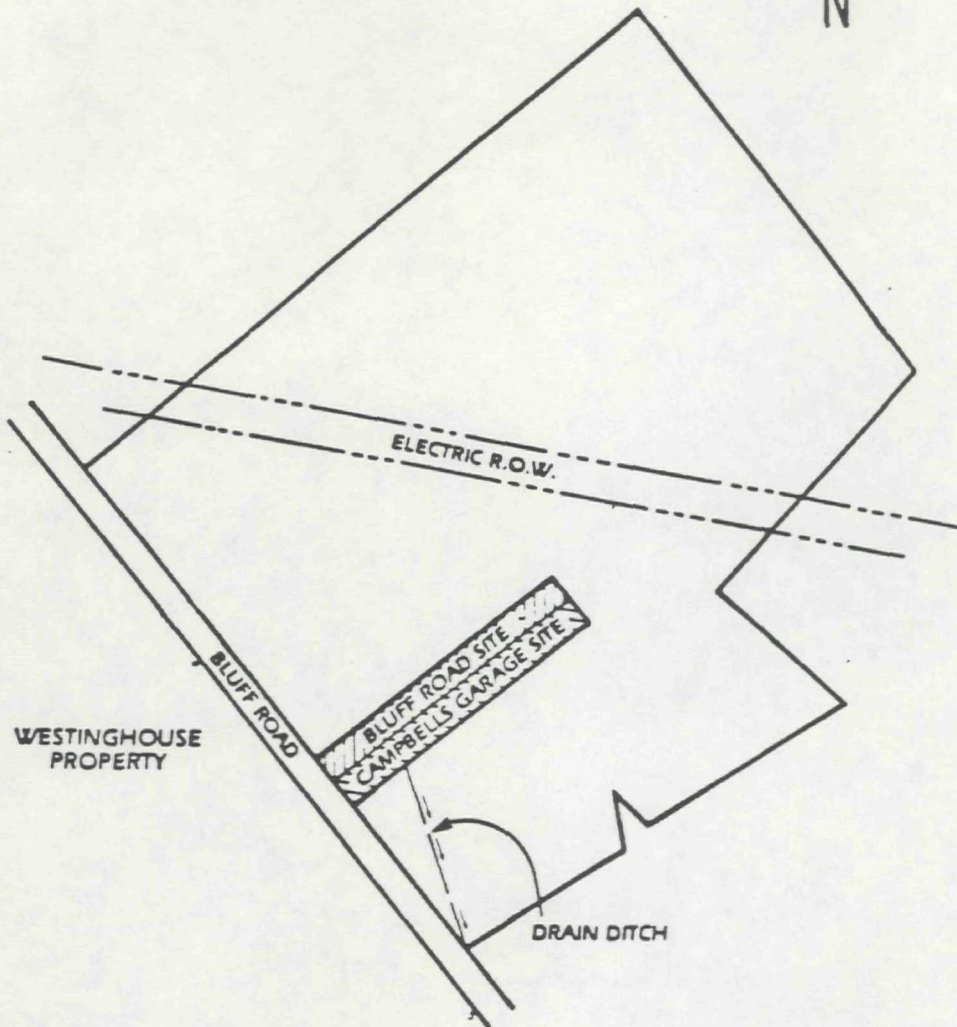
The Bluff Road Site consists of an abandoned chemical waste recycling and disposal area sited on about four acres, of which two acres were actually used for waste material storage (Figure 2). The study area was the site of extensive disposal activity from 1976 to 1982. Prior to SCRDI's operations, the site was used as an acetylene manufacturing facility.

The Bluff Road Site was included on the National Priorities List (NPL) in October 1981. At the time of NPL listing, approximately 7,200 drums of toxic, flammable and reactive wastes were stored on-site, as well as numerous smaller containers. Two small lagoons near the center of the site are remnants of lime slurry disposal used by the acetylene manufacturer.

The first investigation conducted on the Bluff Road site was performed by the Surveillance and Analysis Division of the U.S. Environmental Protection Agency (EPA). Results



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NOT TO SCALE

EBASCO

REM III
SITE MAP
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

FIGURE

1-2

are described in their report entitled "Groundwater and Surface Water Investigation, South Carolina Recycling and Disposal, Inc., Bluff Road Site, Columbia, South Carolina," July 1, 1980. During their site visit (March 1980), the investigators noted "numerous examples of spillage and/or leaking drums in the drum storage area," "chemical spillages exist in direct contact with water pooled in the old filled lagoon," and "badly contaminated surface water drains directly to a swampy area adjoining the site." Fourteen samples were obtained which included soil samples from the Bluff Road site, water and sediment samples from drainage features near the site, water samples from local water wells, and water and sediment samples from Myers Creek.

A variety of metals were present in soil and water samples collected on and around the Bluff Road site. Possible sources of the metals include deteriorated drums, natural soil metals, and waste lime, as well as spilled hazardous wastes. Surface water and sediment samples from the onsite lagoon area showed elevated levels of calcium when compared to the other samples (Figure 3-2). Water from the Bluff Road well exceeded secondary water quality standards for iron and manganese and approached primary drinking water standards for lead. EPA concluded that the sediment and water samples from Myers Creek, (Figure 1-1) were within normal ranges.

Organic compounds found in surface water and soil samples from the Bluff Road site included phthalates, pesticides, other aromatic compounds including chlorinated benzene and phenols, and other compounds tentatively identified as organics by EPA. Volatile organic compounds were not found in the surface soils, although drums of volatile compounds were observed to be leaking. Volatile organics were found in surface water samples. Traces of phthalates were found in both surface water and groundwater. A trace of dieldrin was found in the Campbell's Garage well, which EPA proposed may have been due to termite or ant control practices.

Groundwater conditions at the site were investigated by the South Carolina Department of Health and Environmental Control (SCDHEC) and described in their report entitled "Investigation of Groundwater at South Carolina Recycling and Disposal Company, Bluff Road Site, Richland County, South Carolina," (January 1981). Investigators installed 11 shallow monitoring wells around the Bluff Road Site and

Campbell's Garage with screened intervals varying between 9 feet and 22 feet in depth. Water level measurements indicated a shallow, relatively flat water table, with flow to the east and northeast.

Initial groundwater quality sampling was performed by SCDHEC in September 1980. Specific conductance of the water samples varied from 20 to 1500 umhos/cm with a pH between 5.0 and 6.0. Lead was found in many wells in excess of drinking water standards (0.05 ppm). Volatile organic compounds were found in many wells. Some of these compounds may be attributable to the use of PVC solvent cement in well construction used by SCDHEC. However, both the number of volatile organic compounds and the concentrations were greatest in wells downgradient of the Bluff Road Site and Campbell's Garage. These results led SCDHEC to conclude that groundwater contamination existed at the site and was moving at a relatively slow rate to the northeast and southeast.

Groundwater sampling was again performed by SCDHEC in August 1982, and the results published as an addendum to their 1981 report. Resampling showed an increase in both the number and concentration of volatile organic compounds, leading SCDHEC to conclude that the groundwater quality surrounding the site continued to be degraded.

Golder Associates was retained by SCDHEC to conduct a Remedial Investigation at the site to determine the type, extent, and degree of soil and groundwater contamination on and around the site. In November 1984, Golder Associates began the Remedial Investigation which included a surface geophysical survey, a soil gas survey, soil sampling, and groundwater monitoring. These tasks were completed in December 1985. In January 1986, treatability studies were conducted on contaminated soil and groundwater samples collected from the site.

In 1987, Camp Dresser and McKee Federal Programs Corporation was tasked with reviewing the Golder Associates RI Report, defining data gaps, and generating RI/FS documents under the REM II contract for an RI/FS Superfund investigation.

In September 1987, a REM III Work Assignment to Ebasco Services Incorporated was initiated from EPA Region IV, to implement an RI/FS investigation for the Bluff Road site. This work was limited to development of a Work Plan and Field Operations Plan.

1.3 SITE DESCRIPTION

1.3.1 Topography, Surface Water, and Drainage

The study area is located in a flat low-lying area between South Carolina Highway 48 (Bluff Road) and Myers Creek (Figure 1-1). Bluff Road, which bounds the southwest side of the study area, is a local topographic high. The land west of Bluff Road slopes toward the west, draining into the Congaree River and Mill Creek. The land east of Bluff Road, which includes the study area, slopes gently eastward toward Myers Creek, a tributary of the Congaree River. Wooded land outside the former facility boundary commonly has ponded water in many areas for several days after a heavy rainfall. Property east of Myers Creek drains westward back into the creek. Myers Creek flows through a broad, swampy area where soft soils and standing water are common.

1.3.2 Geology

This section presents a brief overview of the geology at and around the Bluff Road Site.

The Bluff Road Site is located in the Upper Coastal Plain physiographic province. In this area sedimentary deposits of Cretaceous and Tertiary Age overlie older crystalline rocks. Because the site is located near the Fall Line (the landward boundary of the Upper Coastal Plain) the sediments are thinner than those closer to the coast. Also, many formations present near the coast are not found among the sediments near the site. The major stratigraphic units present in the region are the Okefenokee, Black Mingo, and Middendorf Formations.

The surficial soils in the vicinity of the site consist of terrace deposits of the Okefenokee Formation. They are water deposited, irregularly interbedded deposits of sand, gravel, and clayey sands. The surficial sands are underlain by the Black Mingo Formation. Regionally the formation consists of an upper portion of dense, massive gray clay and a lower portion of coarse-grained, cross-bedded sands. The predominant clay mineral in the upper portion is montmorillonite with quartz, opal, calcite, and mica minerals also being present. The lower

portion of the Black Mingo Formation consists of coarse-grained sands sometimes containing glauconite. These sands are very similar to those in the underlying sediments.

The Middendorf Formation is the deepest of the sediments in the region and directly overlies the crystalline rocks. Near the Fall Line the formation was deposited in a fluvial environment and consists of irregularly interbedded sand and gravel, light colored feldspathic and kaolinitic sands, and lenses of kaolin. Some upper beds exhibit a distinctive purple and white mottling.

1.3.3 Hydrogeology

The hydrogeology of the sediments in the region is relatively simple. The surficial sand is the uppermost aquifer of the region. Recharge is by infiltration of rainfall from the ground surface. Water in this aquifer is typically slightly acidic with low total dissolved solids. However, natural iron concentration may exceed drinking water standards in some locales. Yields from this surficial aquifer are generally sufficient for domestic use. The clay underlying the surficial sands is an aquitard restricting the downward flow of groundwater from the surficial aquifer and serving as a confining layer for underlying aquifers. The sands of the lower Black Mingo and Middendorf Formations are very similar and are hydraulically connected. These strata constitute a confined aquifer. This is an important aquifer in the region with yields generally sufficient for irrigation or industrial use. Water quality is suitable for most purposes. The aquifer is primarily recharged in the Formation's outcrop area near the Fall Line.

1.4 OVERVIEW OF FIELD ACTIVITIES

Various field investigations will be conducted to collect the data necessary to meet the RI/FS objectives (see Section 3.0 of the Work Plan). Provided below is a brief description of the activities that will be conducted during the RI at the Bluff Road site. Detailed descriptions of the procedures which will be used to accomplish these tasks are given in Section 3.0 of this FSAP. The investigations have been planned using the existing data as a preliminary basis for the numbers and locations of all investigative

tasks. Adjustments to these proposed investigations may be made during the RI as additional data become available. Such adjustments would result from discussions among the Field Operations Leader (FOL), Site Manager (SM), Regional Manager (RM), and the EPA Remedial Project Manager (RPM).

1.4.1 Preliminary Activities

Preliminary activities will be conducted during a field visit prior to initiation of the RI. This will allow assigned personnel to become familiar with the site's physical characteristics so that accurate placements of site trailer, decontamination area, and drill staging area can be determined.

Off Site Access:

- o Tax maps will be obtained so that property ownership may be established for off site sampling and well drilling tasks.
- o A list of important local telephone numbers and addresses will be obtained (i.e., electrical contractors, phone company, organic free water system, etc.).

Property Reconnaissance:

- o The entire Bluff Road Site will be visually inspected to identify waste disposal areas, above and below ground tanks, leachate seeps, or other areas of interest which may require investigation.

1.4.2 Site Screening

Site screening activities will be the initial field tasks conducted during the RI. Site screening activities will include air quality monitoring, private well inventory, surface soil screening, and groundwater screening.

Air Quality Monitoring:

- o The on-site air quality monitoring investigations will encompass two regimes of air quality monitoring to meet the following objectives: (1) general site survey to establish and verify levels

of personnel and public protection; and (2) target area survey to qualitatively identify potential sources of organic vapor emissions.

Private Well Inventory:

- o An inventory of private wells will be compiled for wells located along South Carolina State Route 37 and any other potentially affected wells downgradient of the site.

Surface Soil Screening:

- o Soil samples will be collected at the surface from within the site area, the adjacent drum staging areas, downgradient of the site, and immediately upgradient of the site. Samples from the soil screening task will be sent to a local laboratory for quick turnaround analysis. Sample analysis will provide guidance for locating temporary soil borings and monitor wells which will be completed during site characterization. Surficial soil data will be used to assess the risk of dermal contact with soils by persons in the area.

Groundwater Screening:

- o Twenty-five groundwater samples will be collected from existing monitor wells installed by Golder & Associates and analyzed for indicator parameters by a local laboratory for quick turnaround service. These data will aid in determining the rate at which the groundwater contaminate plume is migrating and provide guidance for new monitor well locations.

In addition to the 25 existing wells, 16 groundwater samples will be collected from shallow (surficial aquifer) temporary wells to better define the extent of the groundwater plume migrating from the site. These samples will also be analyzed by a local laboratory for quick turnaround service. The samples will be analyzed for VOC and metals. These data, combined with existing monitor well samples, will provide for more accurate placement of new permanent monitor wells.

1.4.3 Site Characterization

Site characterization activities will be undertaken at the conclusion of screening activities without demobilization of the field team. Soil borings and monitor wells within the study area will provide geologic, hydrogeologic, and engineering information on the identity and concentration of contaminants within and migrating from waste disposal areas via soil or groundwater.

Subsurface Soil Investigation:

- o Twenty-nine soil borings will be performed to better define the lateral and vertical extent of contamination and provide a site specific geologic profile for the site. The soil borings will be advanced to the top of the uppermost aquifer and the elevation of the aquifer determined. The location of each boring will be determined from the results of the site screening task. Split-spoon samples will be collected every five feet to the water table of the uppermost aquifer; an estimated 87 samples will be sent to a local laboratory for TCL analyses. Four soil borings will be sited so as to be completed as shallow monitor wells. It is expected that the soil borings will not extend deeper than 15 feet. The soil sampling analysis will provide a better determination of the extent of soil contamination.

Surface Water and Sediment Investigation

- o To obtain data necessary to define the contaminant loadings from the site to Myers Creek and the Congaree River, surface water and sediment sampling will be performed at seven locations. Sediment samples will be collected from any surface run-off areas within the site boundaries and analyzed by a CLP laboratory.

Lagoon Sampling:

- o Surface water and sediment samples will be collected from the onsite lagoon to better define the type and degree of contamination present. In addition, subsurface hand auger soil samples of

material within the on-site lagoon and closed lagoon will be sampled and analyzed, to determine the hazardous nature of the material. All samples will be sent to a CLP laboratory for the analyses.

Groundwater Investigation:

- o Seventeen shallow two-inch nominal diameter stainless steel monitor wells will be installed on or near the site to determine the extent of the contaminant plume in the surficial aquifer.
- o Four deep monitor wells constructed of two-inch nominal diameter stainless steel will be installed in the deep confined aquifer to determine if contamination has entered this aquifer.
- o Four Shelby tube samples will be taken from the Black Mingo Clay Formation and sent for laboratory determination of permeability and cation exchange capacity. Particular attention will be paid to ascertaining what effect the organic chemicals present in the groundwater will have on the ability of the clay to act as an aquitard. This information will be useful in determining the potential for groundwater contamination and the feasibility of remedial alternatives.
- o Each of the 21 new monitor wells will be sampled once. These samples will be sent to a CLP laboratory for TCL analyses so that groundwater quality can be established.
- o Slug tests will be performed in all new monitor wells to determine the hydraulic conductivity of each aquifer.
- o Water levels will be collected from all newly installed monitor wells, as well as all existing wells so that groundwater flow direction can be determined.
- o These data obtained from Shelby tube analysis, slug testing, and static water level measurements will be used for determining vertical groundwater gradients in the surficial aquifer and through the clay aquitard underlying the surficial sand aquifer.

Aquatic Biota Survey:

- o Determine the abundance and diversity of fish and benthic macroinvertebrates in the streams at the seven surface water sampling stations.
- o Fish specimens will be collected from the streams, where possible, at the seven surface water sampling locations.
- o Benthic macroinvertebrate organisms collected will be identified to a general level to determine diversity index, tolerance categorization, and counted to determine abundance.
- o Inventory fish and benthic macroinvertebrates and determine in-situ measurements of pH, temperature, and conductivity at the seven surface water sampling locations.

2.0 GENERAL FIELD OPERATIONS

2.1 MOBILIZATION ACTIVITIES

Following the approval of this FSAP, arrangements will be made for a field trailer to be placed at the site. A field sampling crew will be scheduled and sampling and health/safety equipment shipped to the site. Electricity, telephone, and port-a-john services will be installed. A deionized/organic-free water system will be installed at the field trailer for decontamination of equipment.

The sampling crew will be thoroughly familiar with this FSAP and EPA Region IV Environmental Services Division (ESD) Standard Operating Procedures (SOPs) prior to initiating the investigation.

2.2 FIELD TEAM PERSONNEL AND RESPONSIBILITIES

The overall project organization and responsibilities of key personnel are discussed in the Site Management Plan. The onsite direction of the field team will be the responsibility of the Field Operations Leader (FOL) who will report directly to the Site Manager. The Health and Safety Officer (HSO) will interact with field team members

regarding onsite activities. Section 2.0 of the Site Management Plan (SMP) presents the names and responsibilities of key field team personnel.

2.3 PERSONAL PROTECTION

A site-specific Health and Safety Plan (HASP) has been prepared as part of the Field Operations Plan (FOP). Section 8.2 of the HASP, Personal Protection, provides information regarding the required levels of protection for various tasks. Section 11.0 of the HASP details personal decontamination procedures.

2.4 FIELD TECHNICAL GUIDANCE

The primary source of technical guidance to be used during field activities at the Bluff Road Site is the 1986 EPA Region IV Environmental Services Division (ESD) Standard Operating Procedures (SOPs). These guidance documents are referenced whenever possible in the description of the field procedures. Minor modifications to the procedures provided in the guidance are occasionally necessary to meet site conditions. These modifications are described when the procedures are referenced in Section 3.0 of this FSAP. Copies of the referenced sections of the documents will be kept in the field trailer and reviewed with the field team before each task.

2.5 FIELD AND ESD QUALITY CONTROL SAMPLES

Quality control (QC) samples generated for laboratory analyses during the RI will include duplicate samples, trip blanks, and field (or equipment) blanks. QC blanks and spiked samples will also be provided by the ESD.

One of every 10 samples of each medium will be duplicated. Field (or equipment) blanks will be prepared each day that equipment is decontaminated from a composite of the final deionized/organics-free water rinse of equipment decontamination and will be analyzed for TCL compounds. In addition, a trip blank for volatile organic analysis only will be submitted with each shipment of samples.

The ESD will also provide QC samples to be submitted to the CLP laboratory with the Bluff Road samples. The ESD will typically provide spiked samples (soil or water) and QC blanks. The number, type, and analytic parameters of these samples are determined by the ESD.

Table 2-1 summarizes the number of samples expected to be collected during each task and the number of duplicates, trip blanks, and field blanks. The number of ESD-generated QC samples is not included on this table since this is determined by the ESD and added to the CLP laboratory request by the ESD. Also shown on Table 2-1 is the type of analyses to be performed, the analytical method, and the data quality objective (DQO) level required.

2.6 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are established to ensure that the data collected are sufficient and of adequate quality for their intended uses. Four data quality levels are typically recognized: Levels I through IV.

Level I data can be collected using portable instruments and is typically used for gross engineering determinations or for health and safety screening. Level II data are the result of field analyses using portable instruments or mobile laboratories that are not generally subject to strict QA/QC procedures. These data can be used to determine the presence or absence of specific pollutants or for screening to determine sampling locations. Level III data are generated by non-CLP laboratories using standard EPA analytic methods. Level III data can be used for remedial design. Level IV data are generated by laboratories using the CLP analytic protocol. Level IV data are often required for risk assessment or in situations where legally defensible data with extensive QA/QC are necessary.

At the Bluff Road site, a lower data quality level is necessary for screening activities than is necessary for data intended for use in the risk assessment. Based on this consideration, data quality levels for each sampling activity at the Bluff Road Site have been established as outlined in Table 2-1.

TABLE 2-1
SUMMARY OF SAMPLING TASKS AND RELATED QC REQUIREMENTS AND ANALYTICAL PARAMETERS
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

<u>Sampling Task</u>	<u>No. Of Samples and Media</u>	<u>No. Of Duplicate Samples</u>	<u>No. Of Field Blanks</u>	<u>No. Of Trip Blanks</u>	<u>Total No. of Samples</u>	<u>Analyses</u>	<u>Source of Analysis</u>	<u>Analytical Method</u>	<u>DQO Level of Analysis</u>
Surface Soil Samples	34-soil	3	1	1	39	Ext. org, pest, PCB, volatile organics, metals, cyanide	Local	As specified in Appendix A	III
Surface Soil Sample Splits	3-soil	1		1	5	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Existing Monitor Well Groundwater Samples	25-water	2	1	1	29	Volatile organics, Local metals, cyanide	Local	As specified in Appendix A	III
Existing Monitor Well Groundwater Sample Splits	2-water			1	3	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Surface Water Samples	7-water	1	1	1	10	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Sediment Samples	7-soil	1	1	1	10	Ext. org, pest, PCB, volatile organics metals, cyanide	CLP	RAS	IV

Note: A full set of analyses will be performed as poart of the trip blank.

TABLE 2-1 (Continued)
SUMMARY OF SAMPLING TASKS AND RELATED QC REQUIREMENTS AND ANALYTICAL PARAMETERS
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

<u>Sampling Task</u>	<u>No. Of Samples and Media</u>	<u>No. Of Duplicate Samples</u>	<u>No. Of Field Blanks</u>	<u>No. Of Trip Blanks</u>	<u>Total No. of Samples</u>	<u>Analyses</u>	<u>Source of Analysis</u>	<u>Analytical Method</u>	<u>DQO Level of Analysis</u>
Lagoon Surface Water Samples	3-water		1		4	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Lagoon Sediment Samples	3-soil		1		4	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Lagoon Soil Samples	6-soil	1	1	1	9	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Groundwater Temporary Wells	16-water	1	1	1	19	Volatile organics, Local metals, cyanide		As specified in Appendix A	III
Split Spoon Samples	87-soil	9	1	1	98	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	III

*If conditions permit

Note: A full set of analyses will be performed as poart of the trip blank.

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TABLE 2-1 (Continued)
SUMMARY OF SAMPLING TASKS AND RELATED QC REQUIREMENTS AND ANALYTICAL PARAMETERS
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

<u>Sampling Task</u>	<u>No. Of Samples and Media</u>	<u>No. Of Duplicate Samples</u>	<u>No. Of Field Blanks</u>	<u>No. Of Trip Blanks</u>	<u>Total No. of Samples</u>	<u>Analyses</u>	<u>Source of Analysis</u>	<u>Analytical Method</u>	<u>DQO Level of Analysis</u>
Split Spoon Sample Splits	9-soil	1	1	1	12	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
Groundwater Samples New Monitor Wells	21-water	2	1	1	26	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV
*Runoff Sediment Samples	5-soil			1	6	Ext. org, pest, PCB, volatile organics, metals, cyanide	CLP	RAS	IV

*If conditions permit

Note: A full set of analyses will be performed as part of the trip blank.

2.7 SAMPLE IDENTIFICATION AND CHAIN OF CUSTODY

Each sample collected will have its own number, which will apply during the entire project. The sample numbers will consist of a four-faceted alpha-numeric code, which will identify the project, type of sample, the sample location, and the number of samples collected at the location.

The sample types are:

MW - Monitoring Well	SW - Surface Water
SS - Surface Soil	SB - Soil Boring
SD - Sediment	TB - Trip Blank

Each location will have a two-digit number (i.e., 01, 02, etc.) followed by a series number (the series number would identify the number of samples obtained from a particular location). For example, the first time monitor well MW-09 (Bluff Road site) is sampled, the number for the sample shall be:

BR-MW-09-1.

If it is sampled again at another time, the sample number would become:

BR-MW-09-2.

For soil borings, the two digit number designating the boring location will be followed by a sample depth range in parenthesis. A sample collected at soil boring -01 from a depth range of 0-2 feet would be designated:

BR-SB-01(0-2)-1.

For duplicates, the letter designation D will be used following the sample type designation. For example, a duplicate sample from soil boring no. 5 taken at a depth of a depth range of 10-12 feet will be:

BR-SBD-05(10-12)-01.

If a duplicate is taken at that point again, the number would become:

BR-SBD-05(10-12)-02.

Spiked samples provided by ESD will be assigned the same type designation as the medium that the spiked sample represents. The spiked sample will not be able to be distinguished from other samples. The spiked sample will be identified on the ESD and sample management traffic reports and chain of custody only. Spiked sample codes will also be recoded in field sampling log books.

Blank samples will be assigned designations in the same manner as spiked samples.

Chain-of-custody procedures are outlined in Section 3.3 of the ESD SOPs. The procedure will be used with no modification.

2.8 SAMPLE CONTAINER REQUIREMENTS, PRESERVATION, AND HOLDING TIMES

Sample container, preservation, and holding time requirements are specified in Appendix A of ESD SOPs. Table 2-2 lists the proposed totals of each type of sample to be collected, as well as the associated container, preservation, and holding time requirements. All samples requiring preservation will be preserved within the time frames indicated in the SOPs.

2.9 SAMPLE SCHEDULING, PACKAGING AND SHIPPING

Samples will be packaged and shipped in accordance with procedures presented in Appendix C of the ESD SOPs. The Site Manager will be responsible for coordinating with the RPM who will contact the EPA Regional Sample Center Coordinator (RSCC) for scheduling each shipment of samples. The RPM will be contacted at least two weeks before each sampling episode and arrangements made to have CLP sample spaces reserved. The REM Laboratory Coordinator will arrange for preparation of spikes and/or blanks and picking up same. The RPM will be informed of any changes in the number or types of samples as the changes occur. The SMO will be contacted by the FOL on the day of each shipment of samples and provide the following information:

- o Dates the samples were shipped
- o Types of samples
- o SMO Case Number
- o Number of Samples
- o Airbill Number
- o Laboratory to which the samples were shipped

TABLE 2-2
 SAMPLE BOTTLE, PRESERVATION AND HOLDING TIME REQUIREMENTS FOR EACH SAMPLING TASK
 BLUFF ROAD SITE
 COLUMBIA, SOUTH CAROLINA

Sampling Task	Total No. of Samples and Media	Analyses	Holding Time	Preservation Requirements	BOTTLE REQUIREMENTS	
					Per Sample	Total
Surface Soil Samples	44-soil	Ext org, pest, PCB	7 days	Cool, 4 degrees celcius	8-oz. glass	44
		volatile organics	14 days	Cool, 4 degrees celcius	4-oz. glass	44
		metals, cyanide	6 months	Cool, 4 degrees celcius	8-oz. glass	44
Existing Monitor	32-water	Volatile organics	14 days	4 drops concentrated HCL Cool, 4 degrees celcius	3 40-ml vials	96
Well Groundwater Samples		metals	38 days	50% nitric acid, pH <2	1-liter polyethylene	32
		cyanide	14 days	NAOH to pH >12	1-liter polyethylene	32
Surface Water Samples	10-water	Ext org, pest, PCB	7 days	Cool, 4 degrees celsius		10
		volatile organics	14 days	4 drops concentrated HCL Cool, 40 degrees celcius	3 40-ml vials	30
		metals	38 days	50% nitric acid, pH <2	1-liter polyethylene	9
		cyanide	14 days	NAOH to pH >12	1-liter polyethylene	9
Sediment Samples	10-soil	Ext org, pest, PCB	7 days	Cool, 4 degrees celsius	8-oz. glass	10
		volatile organics	14 days	Cool, 4 degrees celsius	4-oz. glass	10
		metals, cyanide	6 months	Cool, 4 degrees celsius	8-oz. glass	10
Lagoon Surface Water Sample	4-water	Ext org, pest, PCB	7 days	Cool, 4 degrees celsius		4
		volatile organics	14 days	4 drops concentrated HCL Cool, 40 degrees celcius	3 40-ml vials	12
		metals	38 days	50% nitric acid, pH <2	1-liter polyethylene	3
		cyanide	14 days	NAOH to pH >12	1-liter polyethylene	3

Note: All sample containers for organic samples will have Teflon lined caps.

TABLE 2-2 (Continued)
SAMPLE BOTTLE, PRESERVATION AND HOLDING TIME REQUIREMENTS FOR EACH SAMPLING TASK
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

Sampling Task	Total No. of Samples and Media	Analyses	Holding Time	Preservation Requirements	BOTTLE REQUIREMENTS	
					Per Sample	Total
Lagoon Sediment Sample	4-soil	Ext org, pest, PCB	7 days	Cool, 4 degrees celsius	8-oz. glass	4
		volatile organics	14 days	Cool, 4 degrees celsius	4-oz. glass	4
		metals, cyanide	6 months	Cool, 4 degrees celsius	8-oz. glass	4
Lagoon Soil Sample	9-soil	Ext org, pest, PCB	7 days	Cool, 4 degrees celsius	8-oz. glass	9
		volatile organics	14 days	Cool, 4 degrees celsius	4-oz. glass	9
		metals, cyanide	6 months	Cool, 4 degrees celsius	8-oz. glass	9
Groundwater	19-water	Volatile organics	14 days	4 drops concentrated HCL Cool, 4 degrees celcius	3 40-ml vials	57
Temporary Wells		metals	38 days	50% nitric acid, <2 pH	1-liter polyethelene	19
		cyanide	14 days	NAOH to pH >12	1-liter polyethelene	19
Split Spoon Samples	110-soil	Ext org, pest, PCB	7 days	Cool, 4 degrees celsius	8-oz. glass	110
		volatile organics	14 days	Cool, 4 degrees celsius	4-oz. glass	110
		metals, cyanide	6 months	Cool, 4 degrees celsius	8-oz. glass	110
Groundwater Samples New	26-water	Ext org, pest, PCB	7 days	Cool, 4 degrees celsius	1-gal. amber glass	26
		volatile organics	14 days	4 drops concentrated HCL Cool, 4 degrees celcius	3 40-ml vials	78
Monitor Wells		metals	38 days	50% nitric acid, <2 pH	1-liter polyethylene	23
		cyanide	14 days	NAOH to pH >12	1-liter polyethylene	23
Runoff Sediment Samples	6-soil	Ext org, pest, PCB	7 days	Cool, 4 degrees celsius	8 oz. glass	6
		volatile organics	14 days	Cool, 4 degrees celsius	4-oz. glass	6
		metals, cyanide	6 months	Cool, 4 degrees celsius	8 oz. glass	6

Note: All sample containers for organic samples will have Teflon lined caps.

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For purposes of scheduling, the ESD and SMO will track sample shipment, receipt, analysis, and data validation and will be responsible for forwarding this information to the potentially responsible parties (PRP). Local laboratory samples will be packaged and shipped in the same manner as CLP samples.

2.10 DOCUMENTATION

Bound, weather-proof field notebooks will be maintained by the field team. Team members shall record all information related to sampling time, weather conditions, unusual events (well tampering), field measurements, etc.

In addition to the field notebooks, a site logbook shall be maintained by the FOL. Essentially, this book will contain a summary of the day's activities and will reference the field notebooks when applicable. Various field reports will also be maintained.

2.11 FIELD AUDITS

Quality Assurance (QA) performance audits will be performed by EPA Region IV Environmental Services Division personnel during the remedial investigation. The audits will include checks on adherence to all sampling protocols. Audit findings will be documented and distributed to appropriate project team members.

2.12 PROCEDURES FOR FIELD CHANGE AND CORRECTIVE ACTION

Corrective action may be initiated as a result of audits, field observations, or complaints. All changes or deviations from this FSAP must be documented in the field notebook. The FOL shall contact the Site Manager, or designee, and explain the reason for the deviation or change. After discussing the situation with the Site Manager, corrective action will be determined and initiated.

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For significant field changes, as determined by the SM, the EPA RPM will be notified for resolution prior to implementation.

2.13 FIELD INSTRUMENTATION

Numerous monitoring instruments will be used during activities and may include the following:

- o Organic vapor analyzer
- o Temperature probe
- o Conductivity meter
- o pH meter
- o Photoionization meter
- o Electronic water level meter

Each device will be calibrated according to the manufacturer's operating manual prior to each day's use. Calibration will be documented on an equipment Calibration Log (FT-13.02). During calibration, an appropriate maintenance check will be performed on each piece of equipment. If damaged or failed parts are identified during the daily maintenance check and it is determined that the damage could have an impact on the instrument's performance, the instrument will be removed from service until the identified parts are repaired or replaced.

2.14 DECONTAMINATION PROCEDURES

All equipment will be decontaminated using the procedures outlined in Appendix B of the ESD SOPs. An organic free water purification system will be set up at the site to provide a consistent supply of organics-free water (as defined in Appendix B of the ESD SOPs) for the decontamination process.

All effluent tubing and fittings of the water purification system will be constructed of teflon^R or stainless steel. Samples of the organics-free water will be analyzed for the TCL components once during each week of field work. The first sample will be submitted for analyses on a quick turnaround basis to confirm proper operation of the system. Arrangements will be made to have access to tap water (installed on site). Glass jugs and teflon^R tubing will be used to pour the organics-free water over the

equipment during rinsing. Teflon^R spray bottles will be used whenever possible to apply the pesticide grade isopropanol.

One decontamination (decon) station will be set up within the Study Area. The station will include a decon/drying table constructed of wood and lined with aluminum foil, and a number of galvanized metal tubs. The table will be constructed such that decon rinse solutions will run off the table and drain onto the ground. The equipment will first be scrubbed in a tub of detergent solution and rinsed with tap water in another tub. The piece of equipment will then be placed on the table and rinsed as described in Appendix B of the ESD SOPs. Equipment will be allowed to air dry on the table or moved into the trailer to dry and then wrapped in aluminum foil as described in the SOPs.

The isopropanol will be captured in wash tubs or 55 gallon drums separately (by the design of the decon table) and allowed to evaporate or will be containerized in 55 gallon drums if so warranted. Rinse water and detergent solution will be discharged onto the ground at designated locations.

Any portion of the drill rig that is over the borehole (kelly or mast, drilling platform, hoist or chain pulldowns and head or cathead, etc.) will be steam cleaned and wire brushed before being brought onsite to remove all rust, soil and other material (which may have come from other hazardous waste sites). The drill rig will then be inspected to insure that all oil, grease, hydraulic fluid, etc. has been removed, all seals and gaskets are intact and no fluids are leaking. Steam cleaning of the drill rig is then required prior to drilling each borehole. If the surfaces of downhole equipment (drill stems, augers, bits, etc.) and sampling equipment are painted, badly rusted or coated with materials that are difficult to remove using the steam cleaning/wire brushing procedure, sandblasting will be employed. In addition, the downhole and other sampling equipment will be further decontaminated using the following procedure:

1. Clean with tap water and laboratory detergent, using a brush if necessary, to remove particulate matter and surface films. Steam cleaning will be required for particularly contaminated equipment.

2. Rinse thoroughly with tap water.
3. Rinse thoroughly with deionized water.
4. Rinse twice with pesticide grade isopropanol.
5. Rinse thoroughly with organic-free water and allow to air dry as long as possible.
6. Wrap with aluminum foil, if appropriate, to prevent contamination if equipment is going to be stored or transported.

2.15 RI WASTE MANAGEMENT

All potentially hazardous wastes generated during the RI will be placed in 55 gallon drums and stored on the ground in a fenced area near the field trailer. Wastes which may be handled in this way include:

- o Disposable protective clothing
- o Disposable sampling equipment
- o Used sample containers from the split spoon sample screening
- o Isopropanol

These wastes will be disposed of at a permitted hazardous waste management facility following completion of the RI. Manifesting of wastes generated during the RI will be the responsibility of the PRP's.

Drill cuttings and well purge and development water will be buried in shallow pit(s) near the well or boring location and will not be handled as described above, except for wells and soil borings drilled offsite, in which case the cuttings, drilling fluids, and well development water will be contained and then disposed of at selected onsite locations. These disposal sites will coincide with existing onsite pits. No wastes generated from onsite activities will be allowed to leave the site.

2.16 QUALITY ASSURANCE PROCEDURES

Duplicate Analyses

A number of the samples submitted to the laboratory will be collected and analyzed in replicate (duplicate). Samples for duplicate analyses will be selected at random by the Field Operations Leader, and so designated at the time they are logged in and the parameters for duplicate analyses are selected. Samples for duplicate analysis will be designated by field personnel at the time of sample collection. Duplicate analyses will be performed for a minimum of one sample for each matrix or for 10 percent of the total samples for each matrix, whichever is greater. Duplicate sample procedures will be applied to both the subcontracted laboratory and the CLP laboratories. This provides a check of sampling equipment and technique for precision.

Standard Quality Assurance Samples

A standard quality assurance sample (spiked sample) is a known amount of an analyte in a consistent matrix prepared by an outside organization. This spiked sample provides information on the accuracy of the analytical method, but it will not give any information on matrix effects or natural background levels of the analyte. Spiked samples will be submitted for analyses for each week that environmental samples are submitted for analyses. All spiked samples will be provided by EPA, ESD, Athens, Georgia.

Trip Blanks

Trip blanks are defined as sample of contaminant free water, already in sample containers that are carried out to the site, stored with any investigative samples collected, and shipped together to the laboratory. Trip blanks will be submitted to the laboratory for analysis at the rate of one trip blank per week of sampling. The true identity of the trip blank samples will be unknown to the laboratory. These samples will be provided by EPA, ESD, Athens, Georgia.

Split Sample

Samples split between several laboratories will be logged in and identified as such. They will be analyzed along with regular samples. Samples split between the subcontracted laboratory and a CLP laboratory will provide check of the analytical procedures of the subcontracted laboratory.

3.0 FIELD INVESTIGATION PROCEDURES

3.1 PROPERTY RECONNAISSANCE

The property reconnaissance will consist of a field inspection of the entire Bluff Road Site. The area will be inspected for signs of disposal (in locations outside known disposal areas) or signs of contaminant migration. Areas of concern may include exposed drums, leachate seeps, disturbed soil, discolored soil, or stressed vegetation. Inspection techniques will include visual observation and the use of a HNu photoionization detector to scan specific areas. Areas of concern will be located on the available maps of the property and marked in the field. Once the topographic maps are completed, the locations of any areas of concern will be added.

3.2 AIR QUALITY MONITORING

3.2.1 Number and Locations of Monitoring Locations

To prevent exposure to contaminants during each operation, air quality will be monitored at each surface soil sampling station before and after each sample is collected. Air quality will also be monitored before and during all subsurface sampling activities and during groundwater sample collection. In addition to air quality monitoring at specific sampling locations, the air quality at the site will be monitored periodically on a daily basis to identify the presence of any hazardous conditions.

3.2.2 Procedures for Air Quality Monitoring

Before and during surface soil, subsurface soil, well installation and sampling, air quality will be monitored with an HNu photoionization meter and/or a OVA organic vapor analyzer. Daily monitoring of the Bluff Road site will also be conducted for air quality determination. All instrument readings will be noted in the field log books.

3.3 PRIVATE WELL INVENTORY

3.3.1 Number and Location for Well Inventory

Approximately 25 private residences southeast of the site along State Route 37 will be contacted to determine if a well is located on the property. Figure 3-3 shows the locations of private residences along State Route 37.

3.3.2 Procedures for Well Inventory

To identify potential receptors downgradient from the site, private residents will be contacted to determine if a well(s) is located on the property and to identify its use, depth, method of installation, and well construction materials used, if known. All information obtained will be recorded in the field log books.

3.4 SURFACE SOIL SCREENING

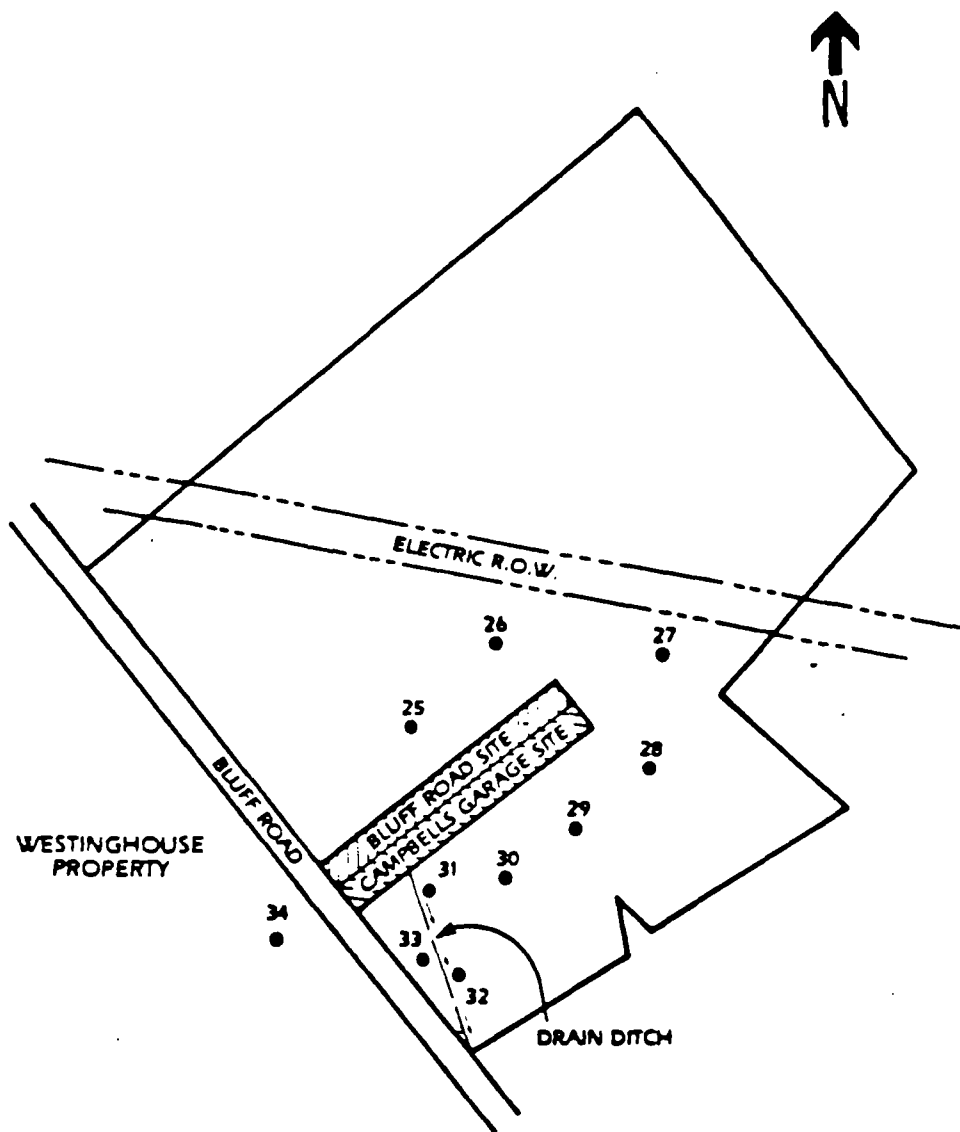
3.4.1 Number and Locations of Samples

Thirty-four soil samples will be collected and analyzed to screen out and/or identify contaminated areas. The location of these samples are designed to screen the relatively large open areas of the site. In addition, upgradient background samples will be collected and downgradient samples will be collected for detection of contaminate migration. Figures 3-1 and 3-2 show the approximate locations of surface soil samples.

3.4.2 Procedures for Soil Sampling and Analysis

Procedures for soil sampling conform to those described in EPA Region IV Standard Operating Procedures and Quality Assurance Manual (SOP), Section 4.9. Each sample location will initially be screened with an HNu photoionization

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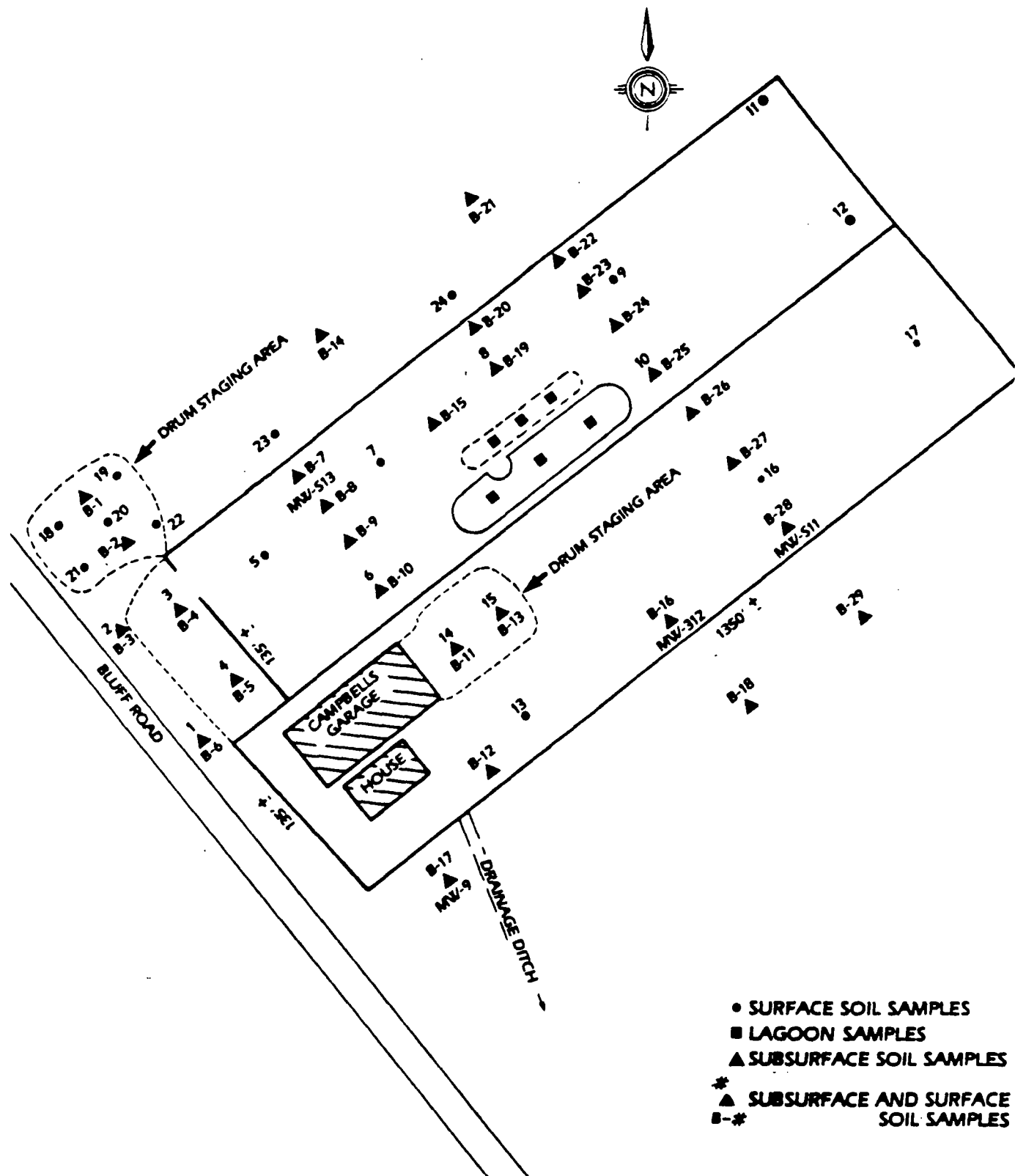
REM III
OFF SITE SURFACE SOIL SAMPLES
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

FIGURE

3-1

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REM III
SITE SAMPLING
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

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FIGURE

3-2

meter or an organic vapor analyzer before sample collection begins. Approximately 34 samples will be collected from the surface to a depth of six inches. All soil samples will be collected using a stainless steel hand auger or scoop. Each sample will be screened using the HNu or an organic vapor analyzer and the values will be recorded in the Field Sampling Log Book.

Soil samples will be analyzed by a local laboratory for quick turnaround analyses. These preliminary data will be used for guidance in planning other sampling tasks and the RI report preparation.

3.5 SURFACE WATER AND SEDIMENT SAMPLING

3.5.1 Number and Location of Surface Water Samples

Seven surface water samples will be collected during the Bluff Road RI. Sampling will be performed at the following locations, if water is available in these water bodies (Figure 3-3):

- o Myers Creek upstream of the confluence with the unnamed tributary to the north of the site.
- o Myers Creek downstream of the confluence with the unnamed tributary to the southeast of the site.
- o The unnamed tributary just upstream of its confluence with Myers Creek.
- o The intermittent stream just upstream of the confluence with Myers Creek.
- o The intermittent stream just downstream of its confluence with the drainage ditch.
- o The drainage ditch to the southeast of the site, just upstream of its confluence with the unnamed tributary.
- o The drainage ditch just downstream of Bluff Road Site.

Surface water samples will be analyzed by a CLP laboratory for TCL analysis.

3.5.2 Procedures for Surface Water Sampling and Analysis

Samples will be collected from these stations directly into the sample bottle whenever possible. VOC samples should be collected first. If the water is too shallow to allow larger sample bottles to be immersed for direct collection, a hole will be dug with a properly cleaned scoop or shovel to allow for room to immerse the sample bottle. Collect a sediment sample and allow the sediment to settle before collecting the water sample. The sample bottle should be held with the opening pointing upstream. The person collecting the sample will stand downstream of the bottle.

3.5.3 Number and Location of Sediment Samples

To provide an indication of long-term contaminant release from the site, surface stream sediments will be collected from the following stations:

- o At each of the surface water sampling locations (Figure 3-3).
- o From any surface run-off areas at the site proper.

3.5.4 Procedures for Sediment Sampling and Analysis

Except for VOCs, samples from each of the points will be placed in a glass bowl (Pyrex), homogenized by mixing with a stainless steel spoon, and containerized (VOC samples should be gently mixed).

Samples will be collected with either an Ekman Dredge or a stainless steel scoop, depending upon the physical conditions at each location. The criterion for use of the Ekman Dredge is as follows:

- o Ekman Dredge equipped with six-foot rigid extension and triggering device - appropriate for shallow streams with significant unconsolidated sediment.

Sediment samples will be analyzed by a CLP laboratory for TCL analyses.

3.6 GROUNDWATER SCREENING

3.6.1 Number and Locations of Groundwater Samples

Samples of groundwater will be collected initially for chemical analysis from 25 existing monitor wells (Figure 3-4).

3.6.2 Procedures for Groundwater Screening and Analysis

Groundwater screening samples will be analyzed by a local laboratory for quick turnaround analysis. All samples will be analyzed for metals and VOCs.

3.6.2.1 Volatile Organic Compounds

Samples for determination of volatile organic compounds (VOCs) will be removed first from the well after purging. Care will be taken to minimize agitation/aeration of the samples at all stages of removal and containerization. Three replicate samples will be taken at each well with a Teflon bailer. Samples for VOCs will be taken as soon as sufficient water volume is available in the well after appropriate purging, and preserved as required in Table 2-2. All samples collected will be placed in a cooler containing ice as soon as possible after samples are obtained.

3.6.2.2 Organic Analyses

Samples for determination of organic compounds will be collected and preserved as provided in Section 4 of the ESD SOP's.

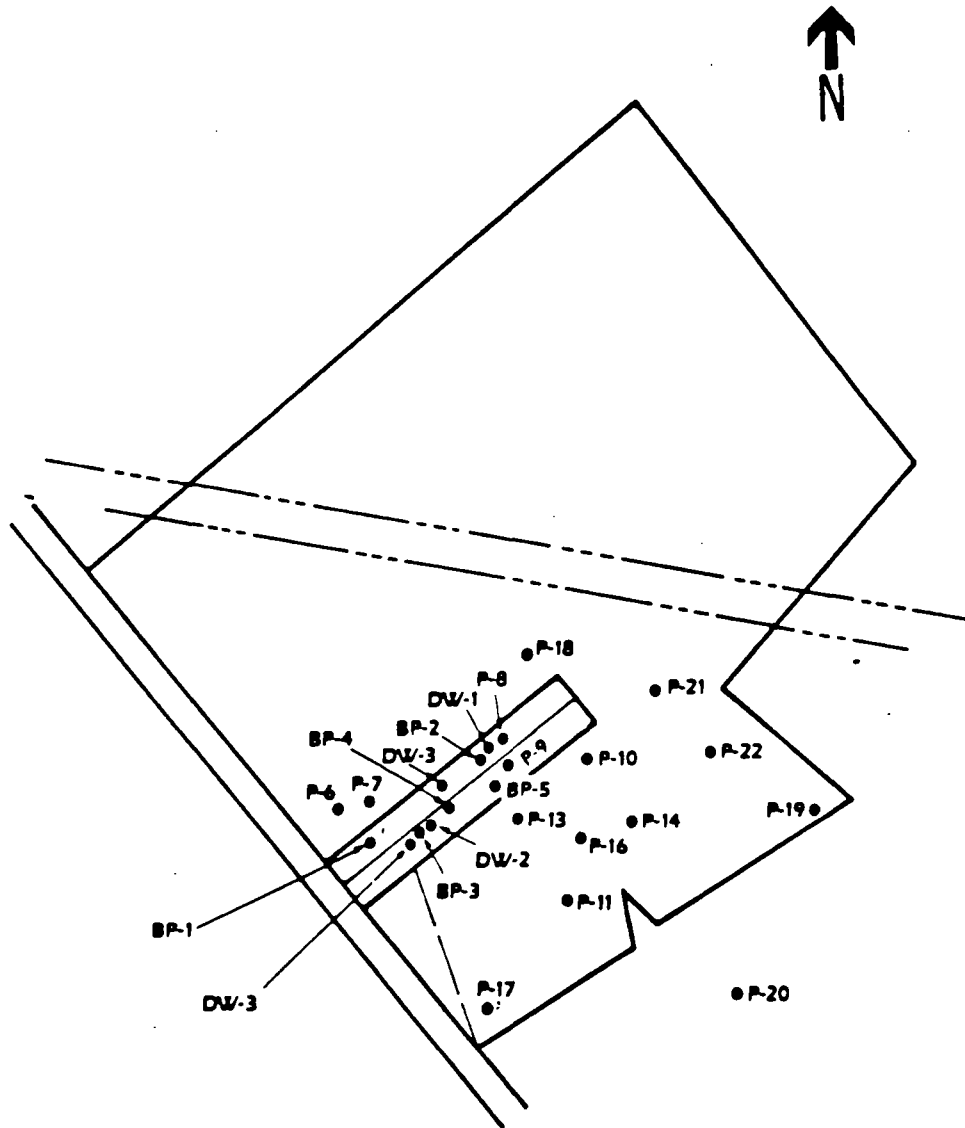
3.6.2.3 Inorganics Analyses

Samples for determination of metals will be collected and preserved as provided in Section 4 of the ESD SOPs.

3.6.2.4 Field Measurements

A separate sample will be collected for the field measurement of pH, specific conductance, and temperature before samples are collected at each sample location. The first water removed from the well will be discharged carefully into a clean glass beaker. Appropriate

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REM III
EXISTING MONITOR WELL LOCATIONS
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

FIGURE

3-4

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instruments will then be used to measure pH, temperature, and specific conductance. Also, measurements will be made immediately after the sample is removed from the well, temperature first to ensure that conditions did not change during sampling. All probes will be rinsed with deionized water and wiped clean with laboratory tissue after use at each well and decontaminated before removal from the site. Instruments will be calibrated and maintained according to manufacturer's recommendations. The pH meter will be calibrated prior to each sampling event with three buffer solutions. Calibration and maintenance events will be recorded in a field log book.

3.7 LAGOON SURFACE WATER AND SEDIMENT SAMPLES

3.7.1 Number and Location of Lagoon Samples

Three surface water and three sediment samples will be collected at the approximate middle of the onsite lagoon. The exact location for sample collection will be determined in the field. The water samples will be collected first with the sediment samples obtained from the same location.

3.7.2 Procedures for Lagoon Sampling and Analysis

All samples will be collected in accordance with the procedures discussed in Section 4.6 of the ESD SOPs. Surface water samples will be collected by dipping the container directly into the lagoon if possible. If the lagoon has inadequate depth to permit the use of this method, a stainless steel or glass beaker will be used to transfer the sample into the container. Sediment samples will be collected using a stainless steel scoop. These samples will be analyzed by a CLP laboratory for TCL compounds.

3.8 LAGOON SOIL SAMPLING

3.8.1 Number and Location of Lagoon Soil Samples

Six sampling locations will be required for both lagoons to determine the hazardous nature of the material. Exact sampling locations will be determined in the field. Approximate lagoon soil sampling locations are shown in Figure 3-2.

3.8.2 Procedures for Soil Sampling and Analysis

Procedures for soil sampling conform to those described in Section 4.9 of the ESD SOPs. All soil samples will be collected using a stainless steel hand auger. As each sample is brought to the surface, it will be screened using the OVA. These samples will be analyzed by a CLP laboratory for TCL compounds.

3.9 TEMPORARY WELL SAMPLES

3.9.1 Number and Location of Temporary Wells

Sixteen temporary wells will be sampled for VOCs and metal analysis. Approximate locations for the temporary wells are shown in Figure 3-5.

3.9.2 Procedures for Installing Temporary Wells

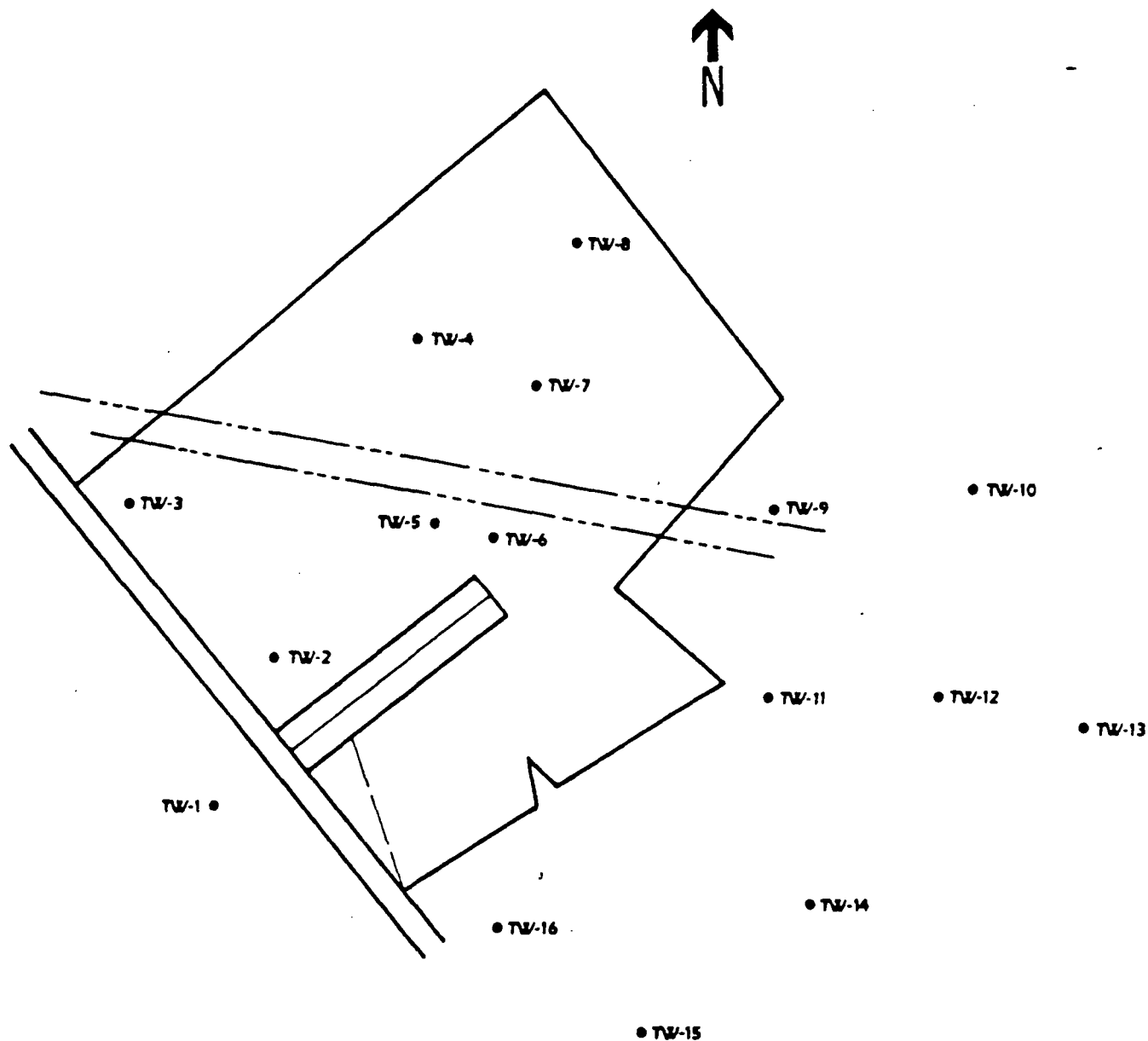
Approximately 16 temporary (10 to 15 feet deep) boreholes will be drilled with a four-inch stainless steel hand auger. The borings will be terminated in the shallow surficial aquifer.

The monitor wells will be constructed of two-inch I.D., threaded flush joint, stainless steel casing with two-feet, 0.010-inch slot, wire wrapped, stainless steel screens containing a stainless steel bottom plug. The wells will have a 2.5 foot riser above ground surface. Following the collection of a representative groundwater sample, the well materials will be removed and decontaminated, and the borehole will be backfilled to the surface with cuttings.

3.9.3 Procedures for Developing Temporary Wells

All wells will be developed following installation by pumping the formation water out until the water is free of sediment and pH, conductivity, and temperature stabilizes. For temporary well sampling the development process will also constitute a well purge. The development should eliminate most of the fine material from the area of the well screen and allow for the collection of a representative groundwater sample which is relatively free of suspended materials. A peristaltic pump will be used to develop the temporary wells.

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REM III
TEMPORARY WELL LOCATIONS
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

FIGURE

3-5

3.9.4 Procedures for Sampling Temporary Wells

After the temporary well is developed to a point where a relatively clear sample can be collected and the pH, conductivity, and temperature stabilizes the well will be sampled according to the procedures outlined in Section 4.7.5 of the ESD SOP's.

The Teflon tubing and silicone tubing will be replaced before each well is developed. All temporary well samples will be analyzed for VOCs, metals, and cyanide by a local laboratory.

3.10 SOIL BORINGS

3.10.1 Number and Location of Soil Borings

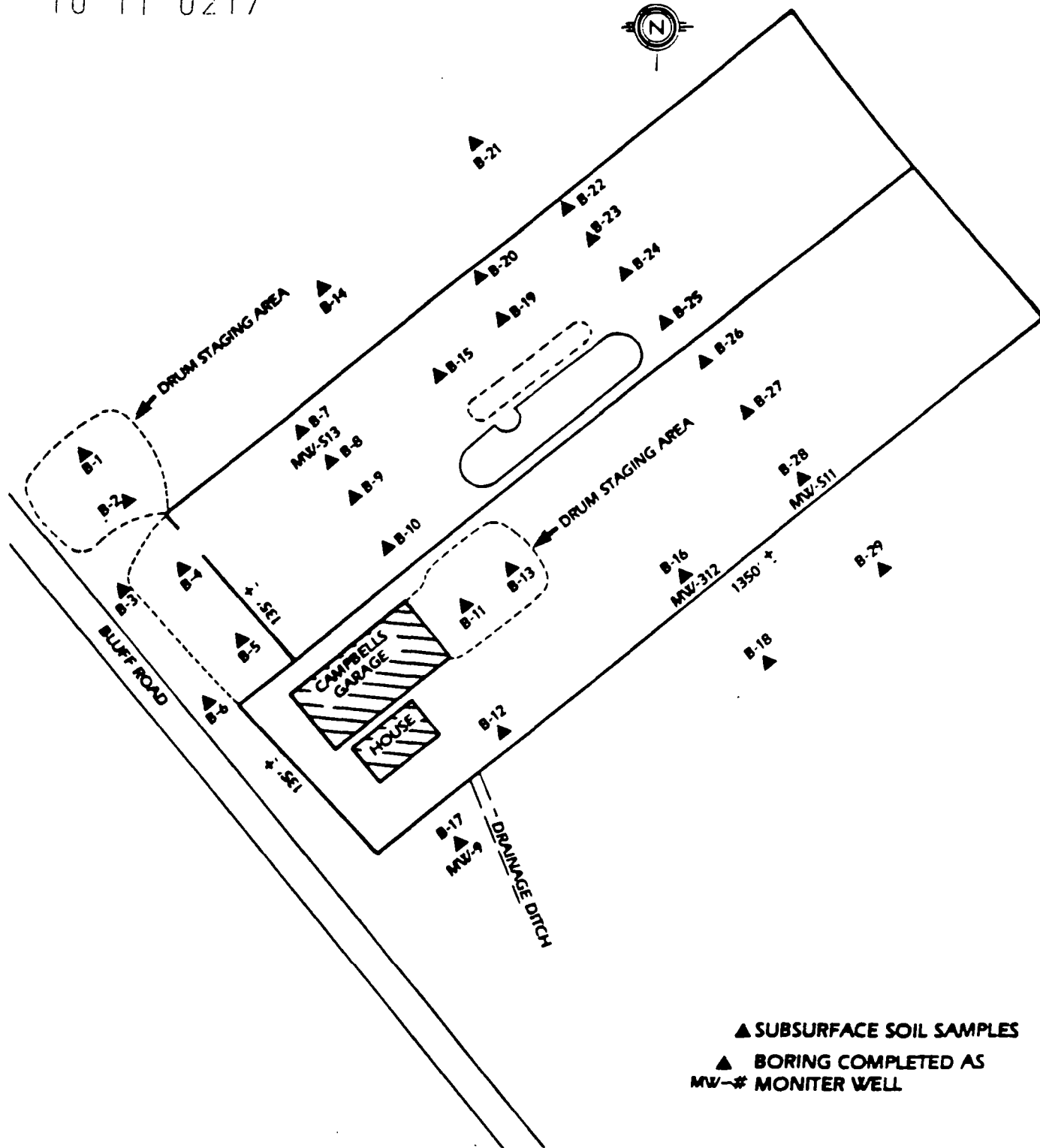
Twenty-nine soil borings will be completed within and near the study area at the Bluff Road Site. Preliminary locations for these borings are shown on Figure 3-6. Exact locations will be determined in the field and will be based on information generated from the site screening investigation. These borings will be completed to identify contaminant concentrations and the general subsurface conditions. Samples will be collected in selected areas of the site as follows:

- o Soil borings on-site for chemical analysis.
- o Soil borings immediately downgradient of the site for chemical analysis.
- o Soil borings immediately upgradient of the site for chemical analysis.

The borings will be advanced to the top of the surficial aquifer and split spoon samples will be collected every five feet, starting at a depth of 5 feet, for lithologic information and sample analysis. The borings are expected to range from 10 to 20 feet in depth.

Each split spoon sample will be geologically logged and screened for organic vapors using the HNu. All samples will be analyzed by a CLP laboratory for TCL compounds. It is anticipated that approximately 87 samples will be analyzed.

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▲ SUBSURFACE SOIL SAMPLES
 ▲ BORING COMPLETED AS
 MW-# MONITOR WELL

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REM III
 SUBSURFACE BORING LOCATION MAP
 BLUFF ROAD SITE
 COLUMBIA, SOUTH CAROLINA

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FIGURE
 3-6

3.10.2 Drilling Procedures

It is anticipated that all soil borings will be completed using the hollow stem auger method. If at a potential soil boring or monitor well location, the hole cannot be completed using a hollow stem auger, the mud rotary method will be used to produce a hole at least six inches in diameter.

Hollow stem auger and mud rotary drilling (if necessary) will be performed according to the procedures outlined in ESD SOP's and the boreholes will be logged by a geologist according to ESD SOP's. A six-inch O.D. hollow stem auger will be used. Split spoon samples will be collected and logged for lithology. The split spoon will be capable of collecting a 24-inch sample. Should mud rotary drilling be necessary, a sample of the bentonite drilling mud will be collected and sent to a CLP and/or REM III laboratory for TCL analyses. The source of water for mud rotary drilling will be a local municipal system. This water will also be sampled and sent for the above described analyses. All proposed procedures are in compliance with the drilling, logging, and split spoon sampling methods discussed in Section 4.7.3.2, 4.7.9.3, and 4.9.4.4 of the ESD SOPs.

Upon completion of sampling, all boreholes that will not be completed as monitor wells will be abandoned by grouting. Grouting will be accomplished by the Tremie pipe method. Grouting will conform to ASTM standard method for neat cement grout C150-69A.

3.10.3 Sampling and Analysis

When the split spoon sampler is retrieved from the borehole, it will be opened and the sample placed in containers according to the procedures described in Sections 4.9.4 through 4.9.6 of the ESD SOPs. Samples from selected depths will be prepared for shipment to a CLP laboratory for TCL analyses. All samples will be placed on ice as soon as possible after collection.

Selected samples will also be sent for laboratory determination of moisture content, grain size distribution, and Atterberg limits. One sample from each soil type encountered during boring operations will be sent for these analyses. An estimated 15 samples will be tested for these

parameters. Also, four Shelby tube samples will be collected and sent for laboratory determination of permeability. The following methods will be used to determine the above mentioned parameters:

- o Moisture content - ASTM D2216-71
- o Grain size distribution - ASTM D422-63
- o Atterberg Limits - ASTM D423-66 and ASTM D424-59
- o Permeability - ASTM D2434-68 or U.S. Corps of Engineers EM-1110-2-1906

Collection of Shelby tube samples will preclude the collection of split spoon samples for chemical analysis. The drilling subcontractor will be responsible for these physical analyses.

3.11 GROUNDWATER INVESTIGATIONS

Approximately 17 shallow monitor wells and four deep monitor wells will be installed at the Bluff Road Site. Six of these wells will be installed to evaluate downgradient water quality and the extent of the groundwater contamination plume. Figure 3-7 shows the preliminary well locations. The exact locations of the wells will be determined in the field and will be based on the results of earlier tasks of the investigation and site conditions. Slug tests will be performed at approximately 12 wells following development and sampling.

3.11.1 Shallow Monitor Well Installation

Monitor well installation will be performed in accordance with Sections 4.7.1 to 4.7.3 of the ESD SOPs. Boreholes will be advanced until the proper depth is reached. Monitor wells will then be constructed of flush threaded, two-inch nominal diameter, type 316 stainless steel riser pipe and well screen. Figure 3-8 illustrates typical well construction details.

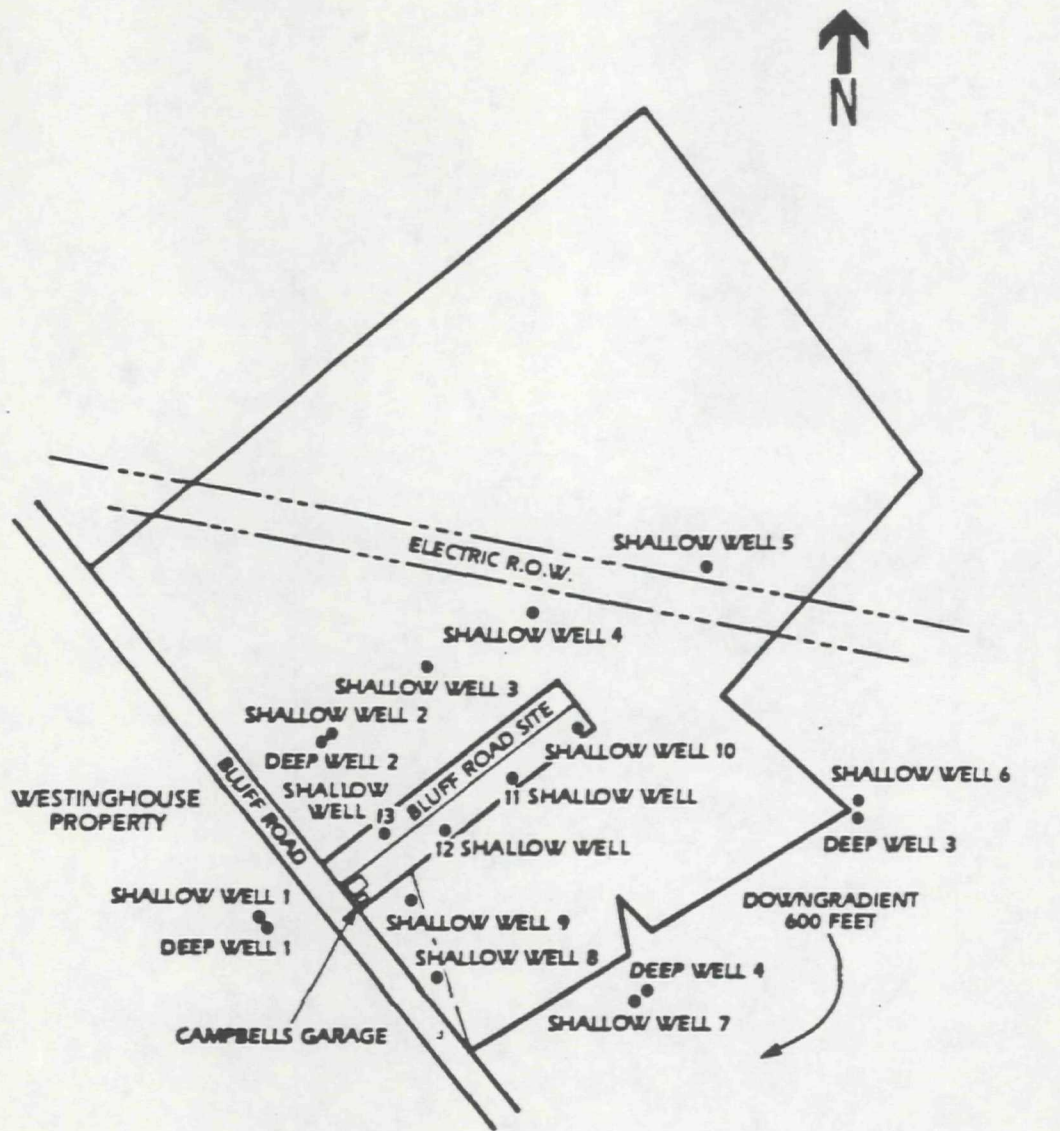
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Since some monitor wells may be installed at relatively shallow depths at some locations (less than ten feet), screen lengths may vary. The well driller will be required to have two-, five-, and ten-foot lengths of well screen available in the field. The Site Geologist will select the screen length based on monitor well depth and the likelihood of wide variations of water level. Ten-foot screens will be used in all deep well construction. Five-foot screens will generally be used in shallow well construction. Shorter screens (two-foot) will be used when, in the opinion of the Site Geologist, the use of a ten-foot screen would compromise the structural integrity or reliability of the well. Well screens will be of the wire-wrapped type and have a slot size of 0.01 inch.

Well installation will involve installing the riser and screen into the open borehole. The screen will then be surrounded with a sand pack consisting of 20/40 mesh silica sand placed by tremie pipe to a minimum depth of two feet above the screen. Stainless steel centralizers will be used if necessary at the bottom and top of the screen to keep the screen centered in the hole while sand is added. A minimum two-foot seal of bentonite pellets will be placed by tremie pipe above the sand pack. The bentonite pellets will be allowed to hydrate for the period designated by the manufacturer, prior to placing the grout. The remaining annulus will be grouted from the top of the bentonite seal to approximately three feet below the ground surface with a bentonite cement grout mixture, by tremie pipe as per ASTM standard method for neat cement grout C150-69A. The grout will be allowed to set for at least 24 hours before additional grout is added to the annulus to compensate for settling. The exact depths of all backfill materials will be determined in the field by the Site Geologist, based on the depth of the well and observed subsurface conditions at each boring location. Backfill depths will be monitored by the driller by means of a weighted steel tape.

A five-foot long, four-inch diameter, steel, protective casing with a locking lid will be placed over the riser to extend about three inches above the riser. The protective casings will be painted fluorescent orange with weather-resistant rust-proof spray paint prior to installation and grout will be added to the inside of the protective casing to a level approximately six inches above ground surface. A stainless steel cap will be placed on

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NOT TO SCALE

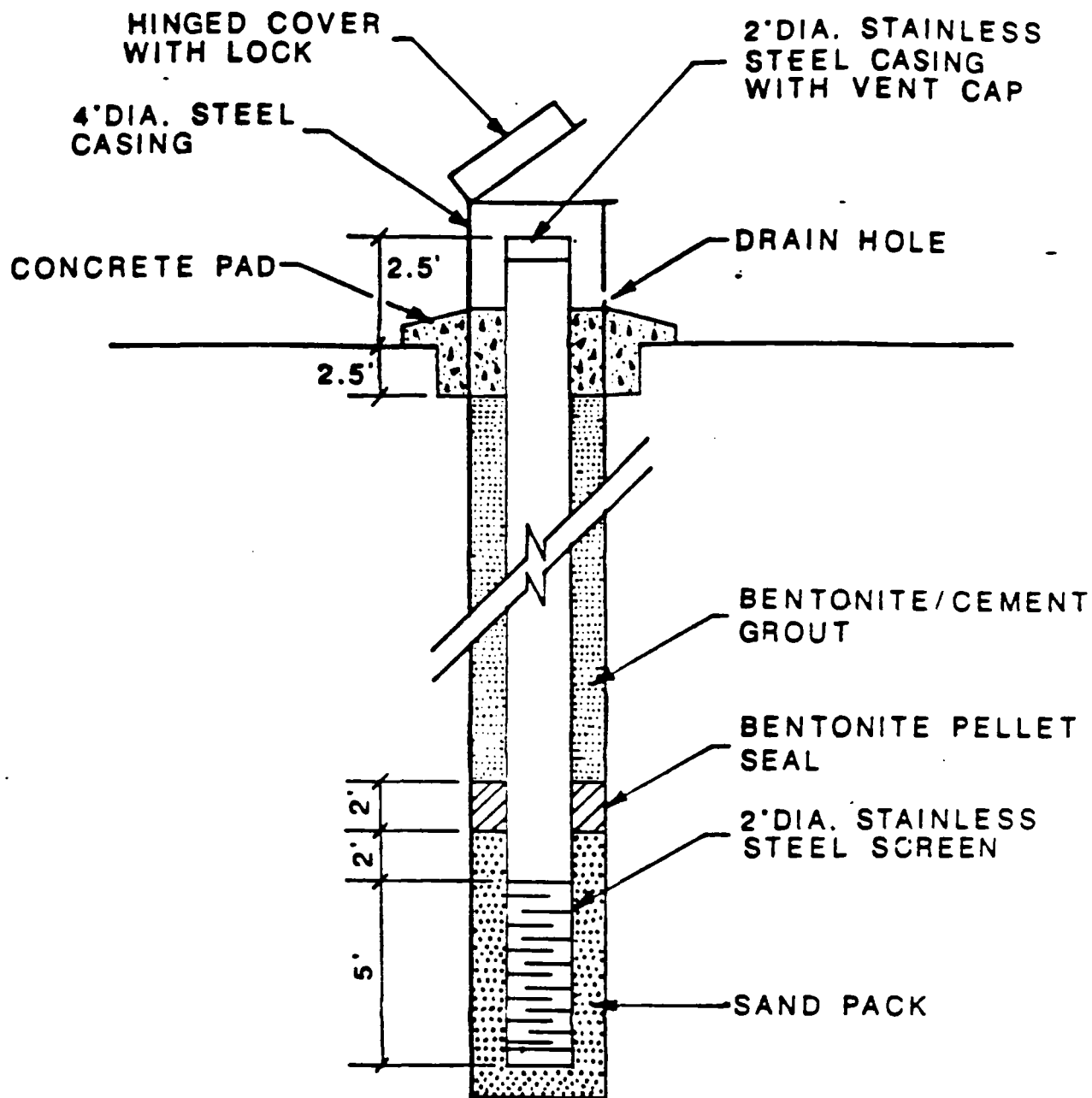
REM III
MONITOR WELL LOCATION MAP
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

FIGURE

3-7

EBASCO

10 11 0222



REM III
SHALLOW MONITOR WELL CONSTRUCTION
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

FIGURE
3-8

EBASCO

the riser pipe. The cap will have a 1/8 inch hole to allow water levels to equilibrate to atmospheric pressure. A 1/4 inch hole will also be drilled in the protective casing at a point just above the inner grout seal.

A four-foot square concrete pad will be constructed around each well (after the grout has set) according to the following specifications:

- o The area around the casing will be excavated to below the frost line, approximately 18 inches.
- o A four-foot by four-foot form constructed of two-inch by six-inch lumber will be placed around the casing.
- o The form will set a minimum of one inch below the ground surface and a minimum of four inches above the ground surface.
- o The form will be filled with concrete.
- o Before the concrete sets, it will be sloped from the casing down to the outer edge to facilitate drainage.
- o After the concrete sets, the forms will be removed.
- o A nail or other permanent mark will be set in the concrete pad for surveyed reference.

3.11.2 - Deep Monitor Well Installation

Four deep monitor wells approximately 100 to 130 feet in depth will be installed. These wells will initially be advanced with a 14-inch diameter bit or auger to the top of the Black Mingo clay. A Shelby tube sample will be collected from the clay at each location. A 12-inch diameter PVC casing will then be installed approximately two feet into the clay and grouted to the surface. After allowing the grout to set for 48 hours, drilling will continue until the deeper groundwater aquifer is penetrated. The boring will then be completed as a permanent monitor well using 2-inch I.D. threaded flush joint, stainless steel casing with a 10-foot, 0.010-inch slot, wire-wrapped, stainless steel screen. The well will

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be completed with a 2.5-foot riser above ground surface. The deep monitor wells will be completed and secured in the same manner as shallow monitor wells, 3.9.1 (see Section 3.10.1). Figure 3-9 shows method for deep well construction.

3.11.3 Well Development

All wells will be developed following installation by overpumping, or using a surge block. Sediment-laden water will be removed as frequently as possible. The frequency and quantity of water removed will be based on the yield of the well. All well development procedures will be in accordance with Section 4.7.4 of the ESD SOPs.

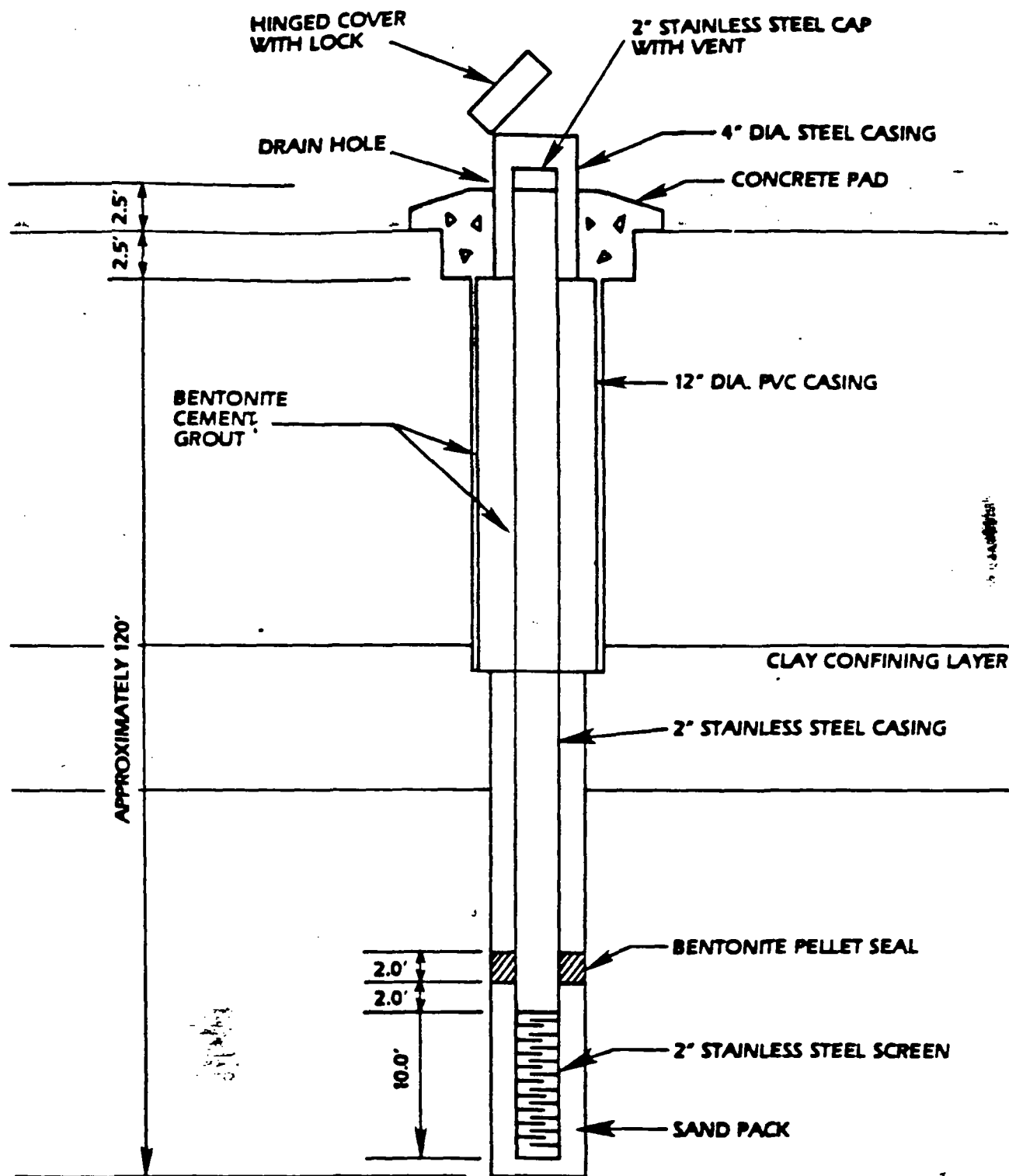
3.11.4 Monitor Well Sampling

Monitor wells will be purged and sampled according to the procedures outlined in Section 4.7.5 of the ESD SOPs. Water level in the well will first be measured and the total volume of the water column calculated. A minimum of three times the volume of water in the well will then be purged or the well will be pumped until dry. Conductivity, pH, and temperature will be periodically measured and recorded during purging. If stabilization of these parameters occurs during purging, purging will be discontinued. A peristaltic or bladder pump and dedicated teflon tubing will be used to purge the wells.

- o After purging is complete, the total metals sample will be collected directly from the pump discharge.
- o The teflon tubing will be removed from the well.
- o The remaining sample fractions will then be collected using a teflon or stainless steel bailer and dedicated nylon cord.

The teflon tubing, silicone tubing, and filter will be replaced before each well is sampled. The same tubing will be used to purge and sample the well.

10 11 0225



REM III
DEEP MONITOR WELL CONSTRUCTION
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

FIGURE No.

3-9

EBASCO

3.11.5 Slug Testing

Following development and sampling of all new wells, approximately 12 wells will be tested to evaluate the hydraulic conductivity of the aquifer in the area of the well. Slug tests will be accomplished using the following procedures:

- o A pressure transducer will be lowered approximately 5 feet into the water and connected to a data logger. This equipment will be of the type manufactured by In-situ, Inc.
- o The data logger and pressure transducer will be activated. A stainless steel or teflon^R slug will then be lowered into the well to displace a volume of water.
- o Once the water level has stabilized, the slug will be quickly removed from the water.

3.11.6 Water Level Measurement

Water level measurements will be collected periodically during the RI investigation. The different events will be:

- o Initial status water levels from existing wells
- o Before groundwater sampling
- o Before aquifer testing
- o Final round of water levels will be collected from existing wells and new monitor wells.

During the first and last measurement task, the team performing the measurements will move directly from well to well until water levels are measured in all wells. All water level measurement procedures will be in compliance with Section 7.7.2.4 and 7.7.5 of the ESD SOPs.

- o The water level will be automatically monitored by a transducer during the falling head tests.

Data generated by these tests will be printed out at the completion of each test. The data will then be entered into a personal computer and evaluated. The data generated from water level measurements will aid in better defining groundwater flow directions and to determine the impact of precipitation events on the aquifer.

3.12 ABANDONMENT OF EXISTING MONITOR WELLS

Eleven shallow (9-22 feet) PVC monitor wells will be abandoned. These wells were installed by SCDHEC in January 1981. The well installation techniques used are questionable by EPA procedures. The well screen and casing will be removed from each well where feasible and the remaining open borehole will be grouted to the surface, by tremie pipe as per ASTM standard method for neat cement grout C150-69A. The grout will be allowed to set for at least 24 hours before additional grout is added to compensate for settling..

3.13 MONITOR WELL SURVEY

A subcontracted licensed surveyor shall be responsible for providing both horizontal and vertical locations for 21 new monitor wells installed by the PRP's contractor, and locations of all abandoned boring locations.

A permanent reference marker (nailhead, etc.) will be placed in the concrete pad at the base of each well. Subsequent location descriptions will reference to this marker. Additionally, horizontal and vertical measurements will be made at the top of each well casing with the cap removed.

3.14 SITE SURVEY

This task will occur concurrently with monitor well surveying. The surveyor will define the site area and provide a base map at a scale of one inch equals 200 feet with all wells and borings located.

3.15 AQUATIC BIOTA SURVEY

The aquatic biota survey will determine the abundance and diversity of fish and benthic macroinvertebrates in the streams at the surface water sampling stations in the

vicinity of the site. The survey will be performed during the remedial investigation. Flow conditions will be measured during the sampling event. For all organisms observed, it will be determined if they are tolerant or intolerant species.

Fish specimens will also be collected in the streams where possible at the surface water sampling stations as described in Section 3.4.1 (except the drainage ditch stations). A field judgement as to the actual number of sampling locations will be made based on U.S. EPA/SCDHEC approval. The number of stations to be sampled may be reduced by U.S. EPA/SCDHEC due to impossible working conditions. Specimens will be collected over a 24-hour period, identified, counted, and released if still alive. Any specimens not alive at the end of the sampling period will be properly disposed of after identification and counting.

Benthic macroinvertebrate organisms will be collected where possible at the surface water sampling stations as described in Section 3.4.1 except for the drainage ditch stations. Organisms collected will be identified to a general level to determine diversity index, tolerance categorization, and counted to determine abundance. All sampling and analyses will conform to U.S. EPA "Biological Field and Laboratory Methods for Measuring the Quality of Surface Waters and Effluents" EPA-670/4-73-001 July 1973.

The RI Investigation will also inventory the fish and benthic macroinvertebrates and determine in-situ measurements of pH, temperature, and conductivity at the surface water sampling locations.

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APPENDIX A

SPECIFICATIONS FOR LEVEL III LABORATORY ANALYSIS
SAMPLE IDENTIFICATION AND CHAIN OF CUSTODY

10 11 0230

SPECIFICATIONS FOR LEVEL III LABORATORY ANALYSES

Level III analytical data is analyses for which there is a high degree of confidence in the compound identification and quantification. The degree of confidence is not as high as Level IV (Contract Laboratory Program) data. The distinction between the two is that with Level III less frequent QC samples are analyzed, more variation is allowed, and the data validation is not as strict. The emphases of Level III data is to support treatability studies, engineering design, engineering action and in some cases, risk assessment.

The QC parameters that are to be used in producing Level III data are found in Table B-1. Additional guidance is found in the Region IV ESD SOPs.

The deliverables for a Level III analysis including a data summary are as follows:

A. General Reporting Requirements

1. Chain-of-Custody Form
2. Laboratory Chronicle which includes:
 - date sample received
 - date sample extracted or prepared (if applicable)
 - date sample analyzed
3. Brief Method Summary
 - if strict adherence to a referenced EPA approval method was followed, only a listing of the method and reference is required.
 - if a non-EPA referenced method (i.e. industrial assay method, etc.) or any deviation from a referenced EPA approved method is followed (i.e. reduction in sample extraction or injection volume, etc.) a method summary or any deviation from the EPA approved method must be provided.

B. Requirements of Organics by GC/MS:

1. Tune summary with signature certification.
2. QA/QC results which include:
 - Duplicate analysis (preferably on a mid-range concentration sample) at a frequency of 1 per 20 samples analyzed.
 - Matrix spike analysis (preferably on a sample containing some contaminants) at a frequency of 1 per 20 samples analyzed. The compounds to be spiked in each analytical fraction are those listed in the most recent CLP IFB SOW.
 - Surrogate compound recovery summary - utilizing the compounds listed in the most recent version of EPA methods 624/625, 1624,/1625, SW-846 or EPA CLP IFB SOW.
3. Sample, blank and standard reconstructed ion chromatogram (RIC).
4. If a library search is performed, the results of the library search (including the ion current profiles) must be provided.

C. Requirements for Organic Analysis (GC/FID/ECD/PID/NPD/ECD/TCD; HPLC: etc.)

1. Sample, blank and standard(s) chromatograms
2. At least one internal standard and/or surrogate compound must be utilized in all analyses. If the method used indicates specific compounds for this purpose, all of these compounds must be utilized.
3. QA/QC results which include:
 - Duplicate analysis (preferably on a mid-range concentration sample) at a frequency of 1 per 20 samples analyzed.

- Matrix spike analysis (preferably on a sample containing some contaminants) at a frequency of 1 per 20 samples analyzed for the analyte in question.

D. Requirements for Pesticides/PCBs (GC/ECD):

1. Sample, blank and standard(s) chromatograms.
2. Dibutylchloroendate must be used as a surrogate
3. QA/QC results which include:
 - Duplicate analysis (preferably on a mid-range concentration sample) at a frequency of 1 per 20 samples analyzed.
 - Matrix spike analysis (preferably on a sample containing some contaminants) at a frequency of 1 per 20 samples analyzed. At least one Arochlor and three pesticides are to be spiked for PCB and pesticide analysis, respectively.

E. Requirements for Inorganic Analyses (metals):

1. QA/QC results which include:
 - Duplicate analysis (preferably on a mid-range concentration sample) at a frequency of 1 per 20 samples analyzed.
 - Matrix spike (preferably on a sample containing some contaminants) at a frequency of 1 per 20 samples analyzed

F. Requirements for Inorganic Analyses (non-metals):

2. QA/QC results which include:
 - Duplicate analysis (preferably on a mid-range concentration sample) at a frequency of 1 per 20 samples analyzed.
 - Matrix spike (preferably on a sample containing some contaminants) at a frequency of 1 per 20 samples analyzed, if possible, for the analyte in question.

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TABLE B-1
QC PARAMETER REQUIREMENTS

<u>Category</u>	<u>QA/QC LEVEL</u>		
	<u>II</u>	<u>III</u>	<u>IV</u>
Holding Time	Region IV ESD SOP Attachment A	Region IV ESD SOP Attachment A	Region IV ESD SOP Attachment A
Blanks	<DL	<DL	<DL
Freq. per samples	30	30	30
Organics:			
Initial Calibration			
Std. Curve	3 points	3 points	3 points
GC/MS			
RF	>0.05	>0.05	>0.05
RF deviation	<35%	<30%	<25%
RRT deviation	<1%	<1%	<1%
GC			
Peak Height/Max.			
Std. Hgt.	>20%	>20%	>20%
RT Deviation	<1.0%	<1.0%	<0.5%
Cal Factors deviation	<35%	<30%	<25%
Continuing Calibration			
Frequency			
Run Begin and End	yes	yes	yes
Samples per Std.	0	20	10
GC/MS/RF	>0.05%	>0.05%	>0.05%
RF Difference	<35%	<30%	<30%
RRT Difference	<1%	<1%	<1%
GC			
RT Variation	1.0%	1.0%	1.0%
Cal Factor	35%	30%	25%

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GC/MS Tuning

DFTPP

m/z compared to

51 198
68 69
70 69
127 198
197 198
198 198
199 198
275 198
365 198
441 443
442 198
443 442

22-75
<2
<2
30-7
<1
100
5-9
7-37
>0.75
<0> (443)
>30
17-23

%

22-75
<2
<2
30-75
<1
100
5-9
7-37
>0.75
<0> (443)
>30
17-23

%

30-6-
<2
<2
40-60
<1
100
5-9
10-30
>1.00
<0> (443)
>40
17-23

BFB

m/z compared to

50 95
75 95
95 95
96 95
173 95
174 95
175 174
176 174
177 176

11-50
22-75
100
5-9
<1
>50
5-9
95-101
5-9

%

11-50
22-75
100
5-9
<1
>50
5-9
95-101
5-9

%

15-40
30-60
100
5-9
<1
>50
5-9
95-101
5-9

Surrogates No.

None

1

2

Recovery

None

see method

see method

Matrix Spikes Freq.

None

1 per 30

1 per 20

Recovery

N/A

40-130%

75-125%

Duplicates Freq.

None

1 per 30

1 per 20

Rel. % Dev. (RPD)

Water

N/A

<35

<25

Soil

N/A

<50%

<40%

10 11 0235

Compound Identification

GC/MS

RRT	0.06	0.06	0.06
m/z ions >10%	all present	all present	all present
% Difference			
intensity	<20%	<20%	<20%
Library searches	None	None	Yes

GC

RT Difference	<1%	<1%	1%
2nd column ID	None	None	Yes

Inorganics:

AAS Std. Curve	3 std's	3 std's	4 std's
ICP Std. Curve	3 std's	3 std's	3 std's

Continuing Calibration

Frequency

Begin Run	Yes	Yes	Yes
Samples per Std.	0	20	10
Control limits	80-120	85-115	90-100

Matrix Spikes

Frequency	0	1 per 30	1 per 20
% Recovery	N/A	60-130	75-125

Surrogates No.

Duplicates

Frequency	0	1 per 30	1 per 20
Soil RPD	N/A	40%	40%
Water RPD	N/a	25%	30%

Laboratory Control Sample

Freq. per samples	N/A	25%	30%
% Recovery	30	25	20
	60-130	70-130	80-120

Atomic Absorption

Duplicate injections			
per cent deviation	30	25	20

ICP

Interference Check

Samples per control	30	20	20
Control Limits	30%	25%	20%

Serial dilution

Freq. per samples	30	25	20
Deviation	20	15	10

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SAMPLE IDENTIFICATION AND CHAIN OF CUSTODY

EPA Region IV ESD SOPs specify the requirements for labeling and shipping samples.

10 11 0237

SITE-SPECIFIC HEALTH AND SAFETY PLAN FOR REM III
HAZARDOUS WASTE SITE ACTIVITIES

SITE: Bluff Road Site

LOCATION: Columbia, South Carolina

DATE PREPARED: January 5, 1988

PREPARED BY: Stephen L. Pilcher/Ebasco Services Inc.
(NAME/COMPANY)

PLANNED SITE ACTIVITY DATES: _____

REVISION: 0

EBASCO SERVICES INCORPORATED, EBASCO SUBCONTRACTORS AND THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE HAZARDOUS NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR USE BY EBASCO PERSONNEL AT THIS SITE AND SHOULD NOT BE USED BY ANY OTHER COMPANY OR INDIVIDUAL OR ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION BY TRAINED HEALTH AND SAFETY SPECIALISTS.

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10 11 0242

1.0 GENERAL

This plan provides recommendations concerning health and safety for those activities associated with the Remedial Investigation/Feasibility Studies at the Bluff Road Site and should be implemented by the Contractor's Health and Safety Officer (HSO) during site work. Compliance with this HASP is required of all persons and third parties who enter this site. The content of this HASP may change or undergo revision based upon additional information made available to health and safety (H&S) personnel, monitoring results or changes in the technical scope of work. Any changes proposed must be reviewed by H&S staff and are subject to approval of the Corporate Health and Safety Officer.

SITE Bluff Road Site SITE NO. _____

PLAN DATE April 1988

SCOPE OF WORK The operations at this site will include temporary borings for water sampling, well inventory, Health and Safety air monitoring, aquifer testing, soil borings/sampling (surface and subsurface), installation of monitoring wells for groundwater sampling, surface water runoff sampling, and an aquatic biota investigation.

	<u>SITE MANAGER</u>	<u>HEALTH AND SAFETY OFFICER</u>
NAME	_____	_____
WORK PHONE	_____	_____

EMERGENCY PHONE NUMBERS

Columbia, S.C.	Police Dept.	(803) 252-2911
Columbia, S.C.	Fire Dept.	(803) 252-2911
Columbia, S.C.	Rescue Service	(803) 252-2911
Baptist	Hospital	(803) 771-5050
Richland Memorial	Back-up Hospital	
National Response Center		(800) 424-8802
Richmond County Poison Control Center		(803) 765-7350

2.0 HEALTH AND SAFETY PERSONNEL

2.1 HEALTH AND SAFETY PERSONNEL DESIGNATIONS

The following briefly describes the health and safety designations and general responsibilities which may be employed for the Bluff Road Site.

2.2 REGIONAL HEALTH AND SAFETY SUPERVISOR (RHSS)

The RHSS has overall responsibility for development and implementation of this HASP. He also shall approve any changes to this plan due to modification of procedures or newly proposed site activities.

The RHSS will be responsible for the development of new company safety protocols and procedures necessary for field operations and will also be responsible for the resolution of any outstanding safety issues which arise during the conduct of site work. Health and safety-related duties and responsibilities will be assigned only to qualified individuals by the RHSS. Before personnel may work on site, currentness of acceptable medical examination and acceptability of health and safety training must be approved by the RHSS.

2.3 SITE HEALTH AND SAFETY OFFICER

The HSO will be present onsite during the conduct of all level A, or B, or high-hazard level C field operations and will be responsible for all health and safety activities and the delegation of duties to the H&S staff in the field. Where the site is identified as low-hazard level C or level D, the HSO may direct the site health and safety efforts through an assistant health and safety officer approved by the RHSS. The HSO or his assistant will be responsible for implementation of the HASP. He may direct or participate in downrange activities as appropriate when this does not interfere with his primary HSO responsibility. The HSO has stop-work authorization which he will execute upon his determination of an imminent safety hazard, emergency situation, or other potentially dangerous situations, such as detrimental weather conditions. Authorization to proceed with work will be issued by the RHSS after such action. The HSO will initiate and execute all contact with support facilities and personnel when this action is appropriate.

2.4 ASSISTANT HEALTH AND SAFETY OFFICER

An Assistant HSO may be designated. On low-hazard level C or level D site he may have collateral duties but must be qualified for the health and safety responsibility by the RHSS. At level A, B or high-hazard level C sites, he will be the down range person who accompanies field sampling teams and will report to the HSO. Additionally, he may be required to support the HSO when multiple operations are conducted that require monitoring and HSO surveillance. His primary responsibility is to provide the appropriate monitoring to ensure the safe conduct of field operations. He will have access to continuous communications with the Command Post. The number of Assistant HSO's will be dependent upon the number of downrange operations occurring simultaneously, site level of protection designation, and the individual assignments made by the HSO. The Assistant HSO will also share responsibility with the Field Operations Lead and the HSO for ensuring that all safety practices are utilized by downrange teams and that during emergency situations appropriate procedures are immediately and effectively initiated. He will also be responsible for the control of specific field operations and all related activities such as personnel decontamination, monitoring of worker heat or cold stress, distribution of safety equipment, and conformance with all other procedures established by the HASP.

3.0 SITE HISTORY AND PHYSICAL DESCRIPTION

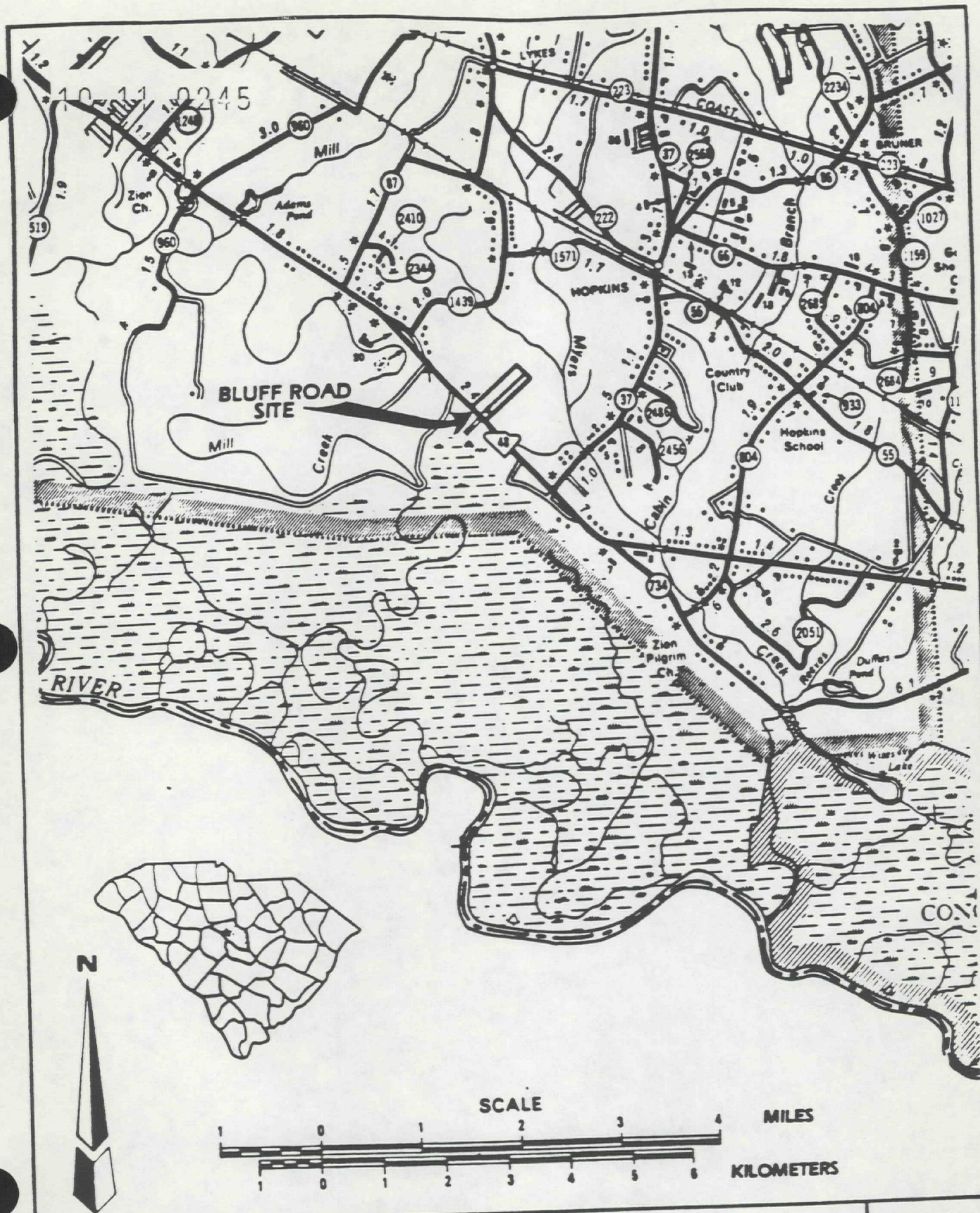
3.1 LOCATION

The Bluff Road site in Richland County, South Carolina, is approximately 10 miles southeast of Columbia, South Carolina (Figure 3-1). The area around the 2-acre site, from Bluff Road to Myers Creek at South Carolina State Road 77, is a wooded, slightly swampy area.

Directly across State Highway 48 (Bluff Road) from the Bluff Road site is the main entrance to the Westinghouse Nuclear Fuel Plant, whose buildings are located 1/4 mile from the highway. The company assembles fuel rods for nuclear power plants.

3.2 DESCRIPTION

As shown in Figure 3-2, the site is characterized by an old abandoned concrete blocked garage and an adjacent burned out

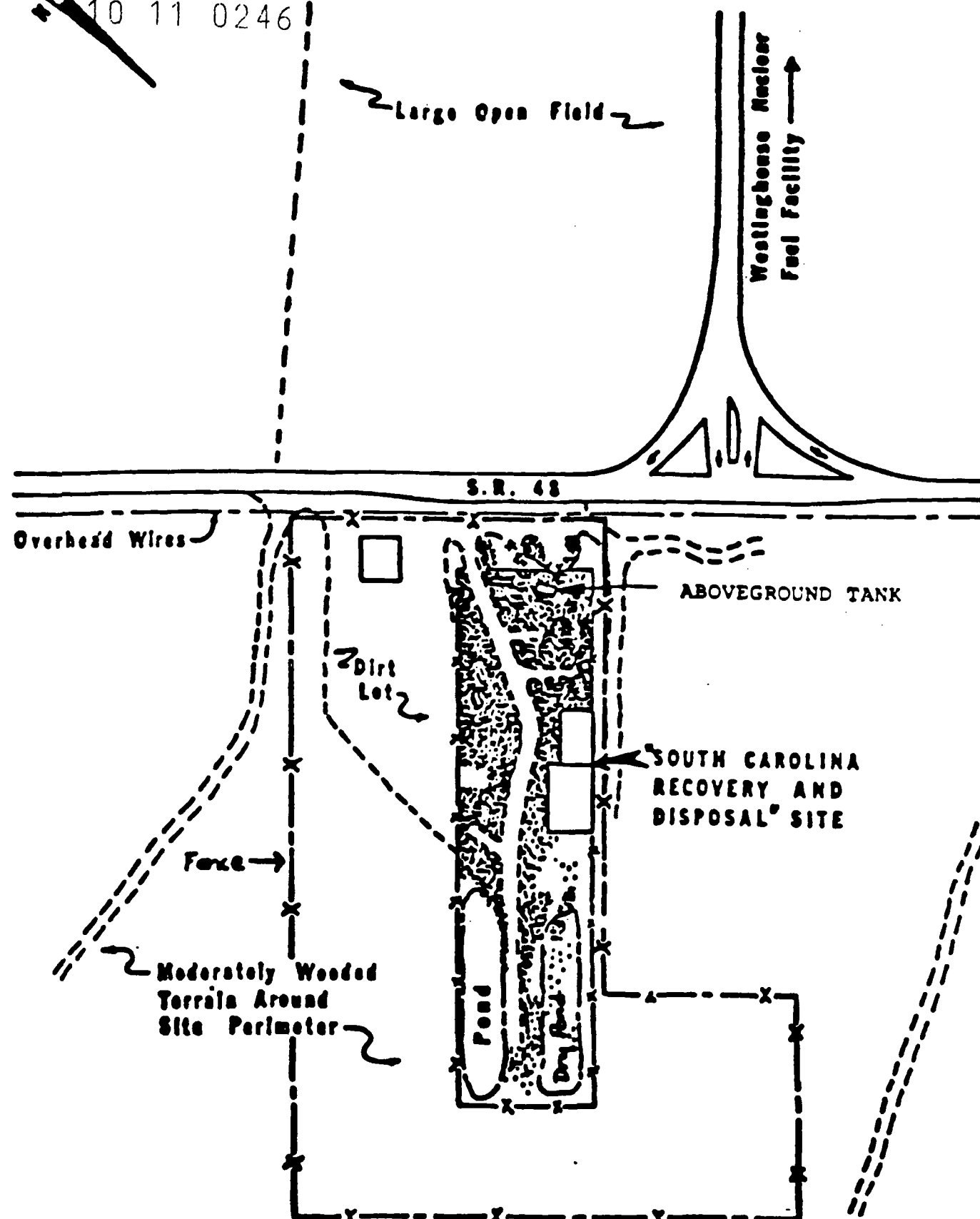


REM III
LOCATION MAP
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

FIGURE

1-1

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SITE LAYOUT

EBASCO
EBASCO SERVICES INCORPORATED

Figure 1-2

home. The original entrance to the site was covered with a protective layer and sand filled. The front gate and fence is located approximately 30 yards from the highway.

Two small lagoons located at the northern end of the site are remnants of the lime slurry disposal ponds used by the acetylene manufacturer that once occupied the property. The western pond contains dried lime and is usually dry; the eastern pond usually holds water at a depth of about 30 centimeters (cm). An old aboveground storage tank contains high levels of phenolic compounds. The old storage area is surrounded by a chain-linked fence. There is no telephone or electricity onsite at present but power and telephone lines run nearby so they can be hooked up.

An intermittent stream is continuous from the Bluff Road site to Myers Creek. The upper end of the intermittent stream has drainage ruts radiating from it. Apparently, the ruts were installed many years ago to help drain the area for logging.

3.3 HISTORY

The site was operated by South Carolina Recycling and Disposal, Inc. (SCRDI) as a storage, recycling, and disposal facility for waste chemicals from 1976 to 1982. A site visit in March 1980 by the United States Environmental Protection Agency (EPA) revealed leaking containers of volatile organic compounds. Chemicals were reportedly observed leaking from the drums into drainage ditches and the onsite lagoons. Analysis by the EPA, of drainage ditch sediments indicated the presence of organic compounds, halogenated organics, pesticides, and metals.

A groundwater investigation was performed by the South Carolina Department of Health and Environmental Control (SCDHEC) in the fall of 1980. Groundwater samples revealed elevated levels of chlorinated organic solvents and lead. Resampling in August 1982 indicated that concentrations of organic compounds in the groundwater were increasing (SCDHEC, 1981).

Preliminary cleanup of the site was performed in 1982 and 1983. Drums of chemicals and contaminated soil were removed and many areas were covered with gravel to provide clean roads. The onsite lagoon, material adjacent to the lagoon identified as lime, and a large aboveground tank remained onsite. Some reports indicate that an underground tank also remains onsite,

however, this is not certain. An area in the rear of the site was cleared and used for detonation of shock-sensitive materials during the site cleanup. This area is referred to as the demolition area (Golder Associates, 1986). The location of the detonation area was not depicted on the site maps in the RI report.

Golder Associates was employed by SCDHEC to conduct a Remedial Investigation (RI) to determine the type, extent, and degree of soil and groundwater contamination on and around the site. In 1985, soil, lagoon water and sediment, sludge from the aboveground tank, and groundwater samples were collected for chemical analysis.

Analysis of composite soil samples for priority pollutant compounds detected primarily volatile organics and some metals. The water samples from the lagoon revealed no priority pollutant organic compounds, but toxic metals were present. Sediment from the lagoon samples showed the presence of toxic metals contamination and slight organic contamination. Sludge samples from the aboveground tank onsite had high concentrations of phenolic compounds. The groundwater analysis revealed nine primary volatile organic pollutants. Analysis of samples of surface water from various runoff points around the site have shown inconclusive results.

4.0 SITE RELATED INCIDENTS, COMPLAINTS, AND ACTIONS

There are no unknown site related incidents or complaints at Bluff Road Site according to information available.

5.0 WASTE DESCRIPTION/CHARACTERIZATION

The following information is presented in order to identify the types of materials that may be encountered at the Bluff Road Site. The detailed information on these materials was obtained from National Fire Codes, 1985, Volume 7 of NFPA and Dangerous Properties of Industrial Materials, Sixth Edition, SAX.

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5.1 CERCLA HAZARD RATING DEFINITIONS

Substance	Health	Flammability	Reactivity
Chlorobenzene	2	3	0
Trichloroethylene	Carcin 2	1	0
Methylene Chloride	3	2	2
1,1,1-Trichloroethane	Carcin 2	1	0
Chloroform	Carcin 3	0	0
Ethylbenzene	2	3	0
Toluene	Carcin 2	3	0
Benzene	Carcin 2	3	0
Zinc	*	0	0
Copper	*	0	
Chromium	*	0	
Arsenic	Carcin	0	
Magnesium	*	0	
Nickel	Carcin	0	

*Hazard will relate to state of element (i.e., Cr(III) vs. Cr(VI))

5.2 WASTE TYPES

Liquid X Solid X Gas X
 Sludge X Semi-solid X Other

5.3 CHARACTERISTICS

Corrosive Flammable X
 Explosive Volatile X
 Radioactive Inert X
 Other

5.4 CONTAINMENT

Pit Pond Lagoon X
 Lake Process Vessel
 Tank X Piping Drum
 Tank Car Lab Pack X
 Other X

5.5 DESCRIPTION OF "OTHER" FOUND IN 5.2, 5.3 and 5.4.

A shock sensitive containment shed is located toward the rear of the site.

6.0 HAZARD ASSESSMENT

The contaminants of concern at the Bluff Road Site are volatile organic compounds such as benzene, methylene chloride, 1,1,1-trichloroethane, chloroform, and toluene. Inorganic constituents including zinc, copper, chromium, magnesium, nickel, and arsenic are also present in different matrices in the contaminated area.

The sludge in the aboveground tank has exhibited concentrations of 2-chlorophenol as high as 33,300 ppm (Golder Associates, 1986). Concentration of organic vapors leaving the tank has been measured in the past at 50-60 ppm (Golder Associates, 1985). Although the tank contents are a health concern, no activities are planned around the tank. The area around the tank will be delineated as off limits to all personnel.

Table 1 provides maximum concentrations of compounds detected at the Bluff Road site.

Table 2 illustrates pertinent toxicological data for the compounds that have been detected in past analysis. For all compounds, the primary working exposure concerns are inhalation (of dust for nonvolatile compounds and of vapor for volatile compounds) and skin contact/absorption.

By far, the predominant compounds are the volatile organic compounds listed in Table 1. Odor thresholds are listed in Table 1; odor characteristics for the volatile organic compounds follow:

- o Chlorobenzene - sweet, almond odor.
- o Trichloroethylene - sweet odor.
- o Chloroform - pleasant, sweet odor.
- o Methylene chloride - pleasant, sweet odor.
- o 1,1,1-trichloroethane - mild, chloroform-like odor.
- o Ethylbenzene - sweet, gasoline-like odor.
- o Toluene - pleasant odor, benzene-like.
- o Benzene - aromatic odor.

7.0 TRAINING

7.1 BASIC TRAINING REQUIRED

All personnel conducting work at the Bluff Road site will be enrolled in a medical monitoring program prior to commencing work at the site. Additionally, all personnel will have attended 40 hour OSHA-approved Personal Protection and Safety Training or its equivalent.

TABLE 1

Maximum Contaminant Concentrations

<u>Organics</u>	<u>Matrix</u>	<u>Concentration (ppm)</u>
Trichloroethylene	S	0.11
	W	5.28
Methylene Chloride	S	4.29
	W	10.0
1,1,1-Trichloroethane	S	1.68
	W	30.6
Chlorform	S	0.37
	W	3.79
Toluene	S	1.08
	W	2.41
<u>Inorganics</u>		
Zinc	B	9.4
	D	23.0
Copper	B	3.8
	D	7.6
Chromium	B	5.0
	D	13.0
Arsenic	B	19.8
Magnesium	B	170.0
	D	480.0
Nickel	B	17.0
	D	39.0

S= Soil
 W= Groundwater
 D= Drainage Ditch Sediment
 B= Lagoon Sediment

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TABLE 2
TOXICOLOGICAL DATA FOR COMPOUNDS PREDOMINANT IN PAST ANALYSES

Compound	Matrix Found	IP ^a	PEL ^b	TLV ^b	Odor Threshold ^b (ppm)	IDLH ^b (ppm)
<u>Volative Organic Compounds</u>						
Chlorobenzene	S	9.07	75	75	0.21	2400
Dichloroethylene	S/W	9.47	100	50	50	1000 Ca
Methylene Chloride	S/W	11.35	500	100	307	5000
1,1,1-Trichloroethane	S/W	---	350	---	400	1000 Ca
Chloroform	S/W	11.42	50 ^c	10	200	1000 Ca
Ethylbenzene	S	8.76	100	---	140	2000
Toluene	S/W	8.82	200	100	0.17	2000 Ca
Xylene	S	9.25	0.05	10	31	2000 Ca

Inorganic Compounds (mg/m³)

Chromium	B/D	---	5 ^c	10 ^c	---	---
Copper	B/D	---	1	---	---	---
Mercury	B/D	---	0.5	---	---	250 mg/m ³
Lead	B	---	0.01	0.2	---	Ca
Magnesium	B/D	---	15 ^d	10 ^d	---	---
Nickel	B/D	---	1	1	---	Ca

Note: Material referenced from NIOSH pocket guide to Chemical Hazards and Chemtox.

^a Ionization potential (eV)

PEL (ppm) = Permissible Exposure Limit. Occupational Safety and Health Administration (OSHA) 1983 set 8-hour time weighted average concentrations allowable in any 8-hour work shift of a 40-hour work week which shall not be exceeded for exposure to airborne contaminants. Inorganics reported as mg/m³.

TLV (ppm) = Threshold Limit Value. Estimate at average safe toxicant concentration that can be tolerated on a regular basis. Inorganics reported mg/m³.

Exide form
Exide fume

- ^a = Lagoon sediment
- ^b = Treated as a carcinogen to man
- ^c = Drainage Ditch Sediment
- ^d = Contaminants in soil
- ^e = Contaminants in water

Training or training and site experience must also conform to the requirements of 29 CFR 1910.120.

7.2 ADVANCED TRAINING

Advanced Training as necessary will be provided to any personnel who will be expected to perform site work utilizing Level B protection or other specialized operation to be undertaken at a site.

7.3 SITE-SPECIFIC TRAINING

Training will be provided that will specifically address the activities, procedures, monitoring, and equipment for the site operations. It will include site and facility layout, hazards, and emergency services at the site, and will detail all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

7.4 SAFETY BRIEFINGS

Project personnel will be given briefings by the HSO or Assistant HSO on a daily or as needed basis to further assist site personnel in conducting their activities safely. It will be provided when new operations are to be conducted, changes in work practices to be implemented due to new information made available, or if site or environmental conditions change. Briefings will also be given to facilitate conformance with prescribed safety practices when performance deficiencies are identified during routine daily activities or as a result of safety audits.

7.5 FIRST AID AND CPR

The RHSS will identify those individuals requiring this training in order to ensure emergency treatment is available at field activities. These courses will be consistent with the requirements of the American Red Cross Association.

7.6 JOB SAFETY AND HEALTH PROTECTION

The OSHA poster (Figure 7-1) or a facsimile must be posted at each site command trailer and each mobile lab trailer or

JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Requirements of the Act include the following:

Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discrimination.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation stating such violations will be issued to the employer. Each

citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory penalties against employers of up to \$1,000 for each serious violation and for optional penalties of up to \$1,000 for each nonserious violation. Penalties of up to \$1,000 per day may be proposed for failure to correct violations within the proposed time period. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to \$10,000 for each such violation.

Criminal penalties are also provided for in the Act. Any willful violation resulting in death of an employee upon conviction is punishable by a fine of not more than \$10,000 or by imprisonment for not more than six months, or by both. Conviction of an employer after a first conviction doubles these maximum penalties.

Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

Such voluntary action should initially focus on the identification and elimination of hazards that could cause death, injury or illness to employees and supervisors. There are many public and private organizations that can provide information and assistance in this effort if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for help such as training.

Consultation

Free consultative assistance without citation or penalty is available to employers on request through OSHA supported programs in most State Departments of Labor or Health.

More Information

Additional information and copies of the Act, specific OSHA safety and health standards, and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations:

Atlanta, Georgia
Boston, Massachusetts
Chicago, Illinois
Dallas, Texas
Denver, Colorado
Kansas City, Missouri
New York, New York
Philadelphia, Pennsylvania
San Francisco, California
Seattle, Washington

Telephone numbers for these offices and additional area office locations are listed in the telephone directory under the United States Department of Labor in the United States Government listing.

Washington, D.C.
20545
OSHA 2203

William E. Brock

William E. Brock, Secretary of Labor

U.S. Department of Labor
Occupational Safety and Health Administration



other conspicuous place where notices to employees are customarily posted. It promotes safe and healthful working conditions at appropriate job sites throughout the nation.

8.0 ZONES, PROTECTION, AND COMMUNICATION

8.1 SITE ZONES

In areas where site personnel will be conducting invasive operations, a restricted area will be clearly marked or identified. For these operations the restricted area will be established as a three foot or greater radius around the operation. Other restricted areas may include storage areas, sources of combustible gases or air contaminants, and other dangerous areas identified during the conduct of the remedial investigation. Access for emergency services to areas for specific site work will be established where necessary in order to provide for rapid access.

It is anticipated that the Command Post will be an onsite office which will be equipped with the appropriate support and safety equipment. Safety equipment will include emergency eyewash, fire extinguishers, stretcher, first aid kit, air horn, and other appropriate equipment. The contamination reduction zone (CRZ) is identified as a specific area adjacent to the support zone and to be utilized for personnel and equipment decontamination. The restricted area (the exclusion zone and the CRZ) will be identified and isolated in such a way as to provide for full public safety and to preclude interference with operations by vehicles and pedestrians. Within the exclusion zone there will be mini-decon/break areas. These areas will contain boot and glove washes, and may have water and Gatorade available if appropriate. The work area/zones will utilize existing barriers as well as ropes, barricades and other similar means to establish and isolate the work area.

8.2 PERSONAL PROTECTION

8.2.1 General

The level of protection to be worn by field personnel will be defined and controlled by the HSO with approval of the RHSS. Basic levels of protection for general operations in conformance with Occupational Safety and Health Administration (OSHA) Standards including 29 FR 1910 and 30 CFR 11, EPA Region IV Standard Operating Procedures (SOP) for Field Health and Safety, as well as all other applicable Federal, State and local regulations. Where more than one hazard area is indicated, further definition shall be provided by review of site hazards,

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conditions, and proposed operational requirements and by monitoring at the particular operation being conducted. Protection may be upgraded or downgraded, as appropriate, only after the HSO receives authorization from the PRPs RHSS.

Field changes will utilize a "Field Change Request" for documentation and approval. See Figure 8-1.

<u>Activity</u>	<u>Level of Protection</u>
Temporary Borings for Water Sampling	B/C/D (Mod.)
Well Inventory	D
Groundwater Testing	D (Mod.)
Surface/Subsurface Soil Sampling	B/C/D (Mod.)
Monitor Well Installation (Groundwater)	D (Mod.)
Surface Water Runoff Sampling	D (Mod.)
Aquatic Biota Investigation	D (Mod.)

For the purposes of this Health and Safety Plan the levels of protection are described below:

Level D - This is the basic work uniform and its components including coveralls, safety boots/shoes, safety glasses (optional), hard hat with optional face shield, and chemical resistant type gloves.

Modified Level D - This level of protection is required for all activities described above (except one) for greater protection due to specific characteristics of the sampling locations. Its components include all of level D's components plus a polycoated Tyvek and an Air Purifying Respirator (APR) - available but not worn. High efficiency particulate/organic cartridges will be available. The donning of the APR may be directed by the HSM/HSO/AHSO in the event of dusty conditions where the FID/PID indicates 0.5 ppm pm or more of particulates in the ambient air or the FID/PID indicates greater than 5 ppm backgroundd. Work will be stopped to consider level B protection.

8.2.2 Initial Levels Of Protection

Initial levels of protection will be employed during the performance of the Initial Reconnaissance. The reconnaissance team is anticipated to consist of a minimum number of personnel. The HSO, the Site Manager or Site Project Engineer, and other appropriate support personnel may be required. The team will enter hazardous areas and spill locations in

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Quality Assurance Project Plan
EPA Contract No.

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Revision Date: 11/30/87
Page of

Figure 8-1

FIELD CHANGE REQUEST

EPA Work Assignment No.	Work Charge Number	Field Charge No.
-------------------------	-----------------------	------------------

FCR

To _____ Location _____ Date _____

Description:

Reason For Change:

Recommended Disposition:

Field Operations Leader (Signature)

Date

Disposition:

Site Manager

Date

Distribution: Regional Manager _____ Others as required _____
Quality Assurance Manager _____
Site Manager _____
Field Operations Leader _____

conservatively-specified protection with appropriate monitoring equipment. The Initial Reconnaissance will allow for the selection of appropriate protection levels for planned operations, decontamination procedures, site layout, sampling strategies, and general safety planning. It should be noted that this HASP allows for upgrading or downgrading of protection levels to conservatively preclude any potential for contamination while not sacrificing protection or efficiency. During the Initial Reconnaissance, the team will perform various monitoring techniques to identify the presence of contaminants as well as assessing the integrity of the site in consideration of safety for the proposed site investigation, sampling, or construction operations. Careful attention shall be paid to conform to requirements of 29 CFR 1910.120(c) relating to Site Characterization and Analysis.

8.2.3 Safety Equipment

Basic emergency and first aid equipment will be available at the Support Zone and/or the CRC, as appropriate. This shall include HASP-specified communications, first aid kit, emergency eyewash or emergency shower or drench system, fire extinguishers, and other safety-related equipment. Also located in the Support Zone or the CRZ will be a backup field team when required to support downrange field teams. Other safety equipment will be located at the site of specific operations, (e.g., a drilling rig), as appropriate.

8.3 COMMUNICATIONS

- o Telephones - A telephone may be located in the Command Post trailer in the Support Zone for communication with emergency support services/facilities.
- o Air Horns - These will be carried by downrange field teams and also will be maintained at the Support Zone for announcing emergency evacuation procedures (see Section 14.0) and backup for other forms of communications.
- o Hand signals - To be employed by downrange field teams along with utilizing the buddy system. These signals are also very important when working with heavy equipment. They shall be known by the entire field team before operations commence and covered during site-specific training.

9.0 MONITORING PROCEDURES

9.1 MONITORING DURING SITE OPERATIONS

All site environmental monitoring should be accompanied by meteorological monitoring of appropriate climatic conditions.

9.1.1 Drilling Operations

Monitoring will be performed continuously by the HSO during the conduct of work. A photoionization detector (PID) and/or flame ionization detector (FID) equipped organic vapor meter will be utilized to monitor the breathing zone, the borehole, and all geological samples upon their retrieval. Results of these monitorings will be recorded in a field log book. Drill cuttings will also be monitored. A combustible gas indicator (CGI) with oxygen alarm will be used to monitor the borehole for the presence of combustible gases. Similar monitoring of any fluids produced during well development will also be conducted.

9.1.2 Excavation Operations

If the CGI indicates a reading off >10% of the LEL, the workers will shift to supplied air. If the CGI is >20%, the area will be immediately evacuated.

9.2 MEDICAL SURVEILLANCE PROCEDURES FOR EVIDENCE OF PERSONAL EXPOSURE

All personnel and subcontractors who will be performing field work at the Bluff Road Site will be required to have passed a medical surveillance examination or equivalent. A release for work will be confirmed by the PRP's RHSS before an employee can begin hazardous activities. The exam will be taken annually at a minimum and upon termination of work. Additional medical testing may be required by the PRP's RHSS in consultation with the company physician and the HSO if an overt exposure or accident occurs, or if other site conditions warrant further medical surveillance. This site requires no specific medical tests beyond the basic physical as stated in Federal guidelines 49 CFR 1910.120.

10.0 SAFETY CONSIDERATIONS FOR SITE OPERATIONS

10.1 GENERAL

All field sampling will be performed under the level of protection described in Section 8. Particular concern should be given under windy conditions as dust may contain inorganic carcinogens along with other contaminants. The HSO/HSM/AHSO should require the use of APRs and protect the skin from exposure under dusty conditions. Further attention should be given to sewer and electrical lines, underground conduits and sample handling requirements. Contamination avoidance will be practiced to avoid unnecessary contamination and subsequent decontamination.

Chemical resistant boots and Tyvek^R suits must be worn where potential contact with contaminated soils and/or water may occur. Also, chemical resistant gloves should be worn during all sampling activities. In addition to chemical resistant boots and gloves, outer boots and gloves should be used to facilitate decontamination procedures. Full face air purifying respirators (APRs) shall be available. The APRs shall be fitted with Mine Safety and Health Administration/National Institute for Occupational Safety and Health (MSHA/NIOSH) approved high efficiency particulate organic vapor cartridges. Ambient dust, FID/PID readings, will determine the need for APRs. Sustained visible dust would indicate windy conditions and may warrant a review of sampling activities to reduce exposure (i.e., local wetting of soils).

Precautions will be taken against the potential for heat and cold stress. Some of these precautions include adjusting work schedules, providing shelter or shaded areas and maintaining workers' body fluids by urging them to drink liquids. Since the scheduled period of work is in the spring, severe heat or cold conditions are not expected to occur.

11.0 DECONTAMINATION PROCEDURES

All personnel and equipment exiting the exclusion zone shall be thoroughly decontaminated. Heavy equipment, if utilized for operations where it may be contaminated, will have prescribed decontamination procedures to prevent hazardous materials from leaving the site. They may include excavating a shallow pit to collect waste cleaning solution and screens, if required, to prevent the spread of air contaminants. The pit will be

cleaned, wastes disposed of, filled in, and covered with clean soil when its use is terminated. The surface area of the pit shall be sufficient to accommodate the washwater generated by the largest piece of machinery. Equipment needed may include a stream generator with high pressure water, empty containers, screens, screen support structures, and shovels.

Decontamination procedures for personnel and equipment shall be conducted at each site prior to exiting the perimeter of the established exclusion zone.

Figure 11-1 describes the personnel decontamination procedure. Outer, more heavily contaminated items (e.g., outer boots and gloves) should be decontaminated and removed first, followed by inner, less contaminated items. Decontamination of outer items will consist of removal of gross soil contamination prior to disposal. Decontamination of inner items will consist of removal of excessive dust with a water spray bottle or disposable wet towels. When not in use, APRs should be kept in closed plastic bags to avoid contamination. After use of APRs, filter cartridges should be removed and the facepiece should be washed with water and disinfectant and towel dried. Tyvek^R suits should be removed by rolling down the body with the suit inside out. Bathing should occur after end of shift.

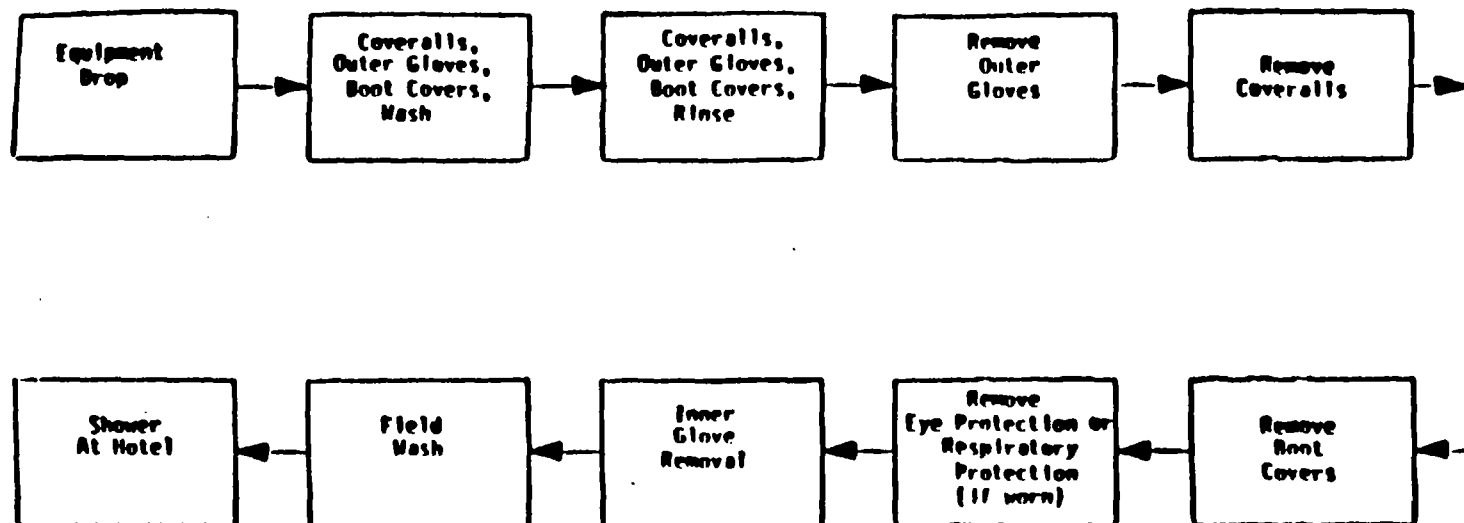
Sampling equipment should be decontaminated by removing gross soil contamination and washing with spray bottle. Augers from the drilling rig should be wrapped in a plastic sheet and taken to a decontamination station to be properly decontaminated with water. The rig itself should be decontaminated by removing any gross soil contamination on it prior to leaving the sampling site.

12.0 ADDITIONAL WORK PRACTICES

No additional work practices are anticipated.

13.0 DISPOSAL PROCEDURES

All discarded materials, waste materials, or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left onsite. All potentially contaminated materials, (e.g., clothing, gloves, etc.), will be bagged or drummed as necessary and segregated for disposal. All



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contaminated waste materials shall be disposed of as required by the provisions included in the contract and consistent with REM III and regulatory provisions. All non-contaminated materials shall be collected and bagged for appropriate disposal as normal domestic waste.

All potentially contaminated materials (e.g., outer boots and gloves, Tyvek[®] suits, towels, etc.) should be bagged and placed in heavy duty plastic garbage cans with lids. All waste materials shall be disposed of as hazardous materials according to appropriate regulations.

Drill cuttings and other excavated contaminated soil may be left onsite.

14.0 EMERGENCY PLAN

As a result of the hazards on site, and the conditions under which operations are conducted, the development of an emergency situation is a possibility

Individual site characteristics will determine preliminary action to be taken to assure that this emergency plan may be successfully implemented in the event of a site emergency. Careful consideration must be given to the proximity of neighborhood housing or places of employment and to the relative possibility of site fire, explosion or release of vapors or gases which will impinge on these neighbors. If there is even a remote possibility of any of these occurrences, the Site Manager must coordinate the neighborhood interface with his Regional Manager, the Community Relations Coordinator, the RHSS and the HSM.

The Site Emergency Coordinator is:

Field Operations Leader _____
or
HSO (Alternate) _____

The emergency coordinator shall make contact with local fire, police and other emergency units prior to beginning work on site. In these contacts the emergency coordinator will inform the emergency units about the nature and duration of work expected on the site and the type of contaminants and possible health or safety effects of emergencies involving these

contaminants. Also at this time the emergency coordinator and the emergency response units shall make arrangements to handle any emergencies that might be anticipated.

The emergency coordinator shall implement the contingency plan whenever conditions at the site warrant such action. The coordinator will be responsible for assuring the evacuation, emergency treatment, emergency transport of site personnel as necessary, and notification of emergency response units.

14.1 EVACUATION

In the event of an emergency situation, such as fire, explosion, significant release of toxic gases, etc.; an air horn or other appropriate device will be sounded for approximately 10 seconds indicating the initiation of evacuation procedures. All personnel in both the restricted and nonrestricted areas will evacuate and assemble near the Support Zone or other safe area as identified by the emergency plan. The location shall be upwind of the site as determined by the wind direction indicator. For efficient and safe site evacuation and assessment of the emergency situation, the Emergency Coordinator will have authority to initiate proper action if outside services are required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The HSO or Assistant HSO must see that access for emergency equipment is provided and that all combustion apparatus has been shut down once the alarm has been sounded. Once the safety of all personnel is established the Columbia, South Carolina Fire Dept. and other emergency response groups will be notified by telephone of the emergency.

14.2 POTENTIAL OR ACTUAL FIRE OR EXPLOSION

In the event of potential fire or explosion (LEL values >20% in the work zone), or if an actual fire or explosion has taken place, immediate evacuation of site (air horn will sound for 10 second intervals) will occur, and local fire and police department, and other appropriate emergency response groups will be notified.

Fire Dept. - (803) 252-2911
Police Dept. - (803) 252-2911

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14.3 PERSONNEL INJURY

Emergency first aid shall be applied onsite as deemed necessary. Then, decontaminate and transport the individual to nearest medical facility if needed. The HSO will supply medical data sheets to appropriate medical personnel and complete the incident report designated in HS-1.12 (Attachment A).

Hospital - (803) 771-5050 (Baptist Hospital)
Rescue - (803) 252-2911

The ambulance/rescue squad shall be contacted for transport as necessary in an emergency. However, since some situations may require transport of an injured party by other means, a hospital route must be firmly identified. The hospital route location map shall also be provided in the HASP as well as conspicuously posted on site.

Primary Hospital Route: (see Figure 14.1, Hospital Route) Take Bluff Road toward Columbia, continuing past the State fair grounds. Turn left at McDonald's restaurant onto Assembly Road. Turn right onto Taylor Street; go two lights and turn right again. Baptist Hospital is at the corner.

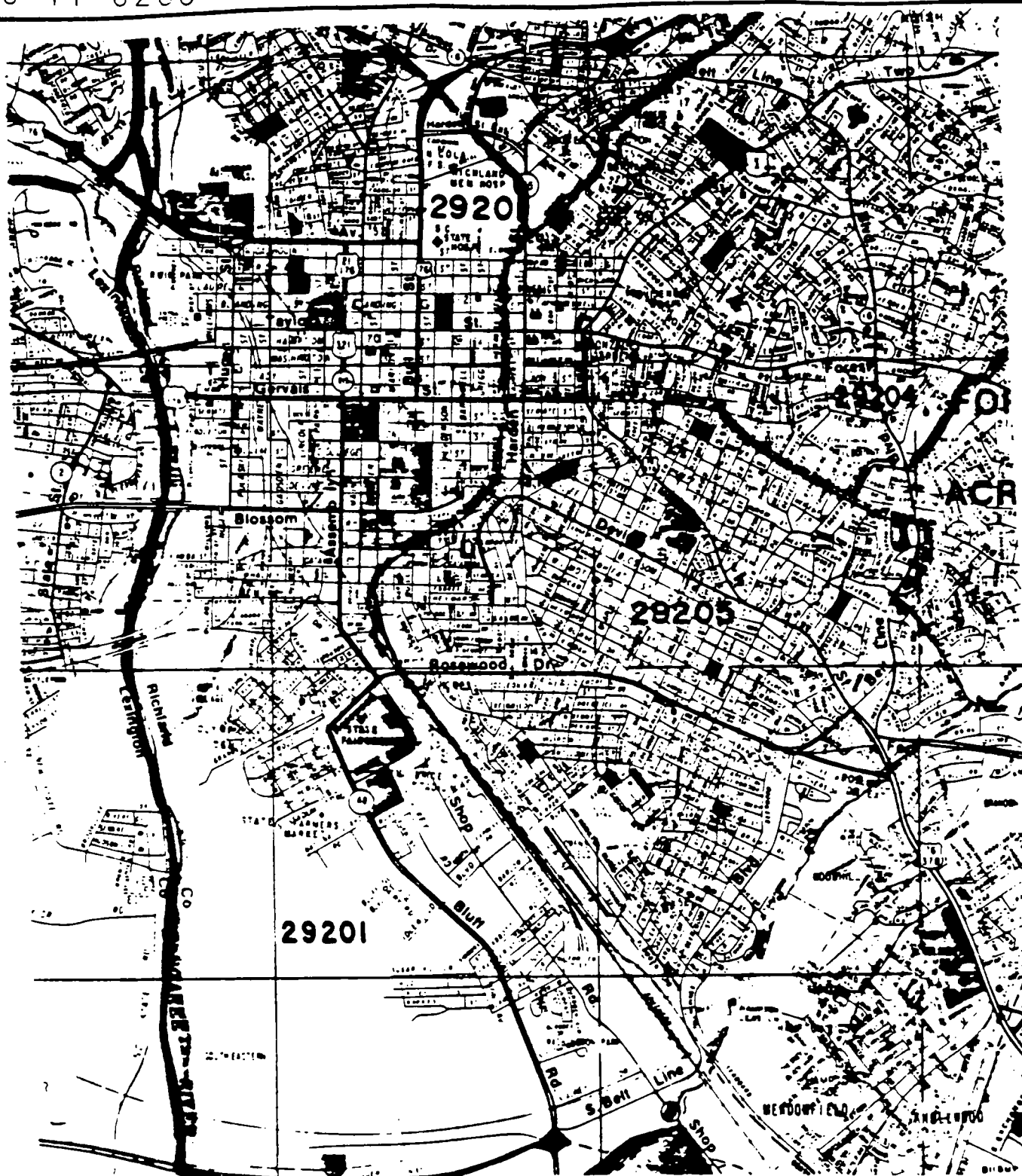
Backup Hospital Route: (also see Figure 14.1) Proceeding to Taylor Street as described for the primary hospital route, Richland Memorial Hospital is located approximately 15 blocks north of Baptist Hospital. Continue in an easterly direction on Taylor for blocks to Bull Street. Turn left and go approximately 8 blocks to Richland Memorial Hospital on the right.

14.4 OVERT PERSONNEL EXPOSURE

Include generic first aid procedures in this section. Typical response includes:

SKIN CONTACT:	Use copious amounts of soap and water. Wash/rinse affected area thoroughly, then provide appropriate medical attention. Eyewash and emergency shower or drench system will be provided onsite at the CRZ and/or Support Zone as appropriate. Eyes should be rinsed for 15 minutes upon chemical contamination.
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Hospital Routes

EBASCO
EBASCO SERVICES INCORPORATED

14-1

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INHALATION:	Move to fresh air and/or, if necessary decon/transport to hospital.
INGESTION:	Decontamination and transport to emergency medical facility
PUNCTURE WOUND OR LACERATION:	Decontaminate and transport to emergency medical facility. HSO will provide medical data sheets to medical personnel as requested (see Section 16.0).

14.5 ADVERSE WEATHER CONDITIONS

In the event of adverse weather conditions, the HSO will determine if work can continue without sacrificing the health and safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- o Potential for heat stress and heat-related injuries
- o Potential for cold stress and cold related injuries
- o Treacherous weather-related working conditions
- o Limited visibility
- o Potential for electrical storms

15.0 AUTHORIZATIONS

Personnel authorized to enter the Bluff Road Site while operations are being conducted must be certified by the PRP's RHSS. Authorization will involve completion of appropriate training courses and medical examination requirements as required by OSHA 29 CFR 1910.10 and review and sign-off of this HASP. All personnel must utilize the buddy system or trained escort, and check in with the Field Team Leader at the Command Post.

1. PRP's Personnel Authorized to Perform Work Onsite:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

2. Other Personnel Authorized to Enter Site:

1. EPA Personnel
2. State Environmental
Personnel
3. Police, Fire,
Emergency Personnel
4. S.C. State environmentalists
associated with Bluff Road
Site/Project.
5. Authorized Subcontract
Personnel

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16.0: MEDICAL DATA SHEET

This brief Medical Data Sheet will be completed by all onsite personnel and will be kept in the Command Post during the conduct of site operations. Completion is required in addition to compliance with the Medical Surveillance Program requirements described in the Health and Safety Plan. This data sheet will accompany any personnel when medical assistance is needed or if transport to hospital facilities is required.

Project _____

Name _____ Home Telephone _____

Address _____

Age _____ Height _____ Weight _____

Name of Next of Kin _____

Drug or other Allergies _____

Particular Sensitivities _____

Do You Wear Contacts? _____

Provide a Checklist of Previous Illnesses _____
or Exposures to Hazardous Chemicals _____

What medications are you presently using? _____

Do you have any medical restrictions? _____

Name, Address, and phone number of personal physician: _____



17.0 FIELD TEAM REVIEW

Each field team member shall sign this section after site-specific training is completed and before being permitted to work on site.

I have read and understand this Site-Specific Health and Safety Plan. I will comply with the provisions contained therein.

Site/Project: _____

[illegible]

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18.0 APPROVALS

By their signature the undersigned certify that this HASP is approved and will be utilized at the Bluff Road site.

Health and Safety Officer

Date

Site Manager

Date

Company Health and Safety
Supervisor

Date

Company Designated Lead

Date

Company Health and Safety
Manager

Date

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ATTACHMENT A

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HAZARDOUS SUBSTANCE INFORMATION FORM

COMMON NAME: _____ CHEMICAL NAME: _____

1. PHYSICAL/CHEMICAL PROPERTIES

SOURCE

Natural physical state: Gas ☒ Liquid _____ Solid _____
 (at ambient temps of 20°C-25°C)
 Molecular weight _____ g/g-mole
 Density _____ g/ml
 Specific gravity^a _____
 Solubility: water _____
 Solubility^b: _____
 Boiling point _____
 Melting point _____
 Vapor pressure _____ mmHg @ _____
 Vapor density _____
 Flash point _____
 (open cup _____; closed cup _____)
 Other: _____

2. HAZARDOUS CHARACTERISTICS

A. TOXICOLOGICAL HAZARD
 HAZARD? CONCENTRATIONS SOURCE
 (PEL, TLV, other)

Inhalation	Yes No	_____	_____
Ingestion	Yes No	_____	_____
Skin/eye absorption	Yes No	_____	_____
Skin/eye contact	Yes No	_____	_____
Carcinogenic	Yes No	_____	_____
Teratogenic	Yes No	_____	_____
Mutagenic	Yes No	_____	_____
Aquatic	Yes No	_____	_____
Other: _____	Yes No	_____	_____

B. TOXICOLOGICAL HAZARD
 HAZARD? CONCENTRATIONS SOURCE

Combustibility	Yes No	_____	_____
Toxic byproducts(s): _____	Yes No	_____	_____
Flammability	Yes No	_____	_____
LPL		_____	_____
UFL		_____	_____
Explosivity	Yes No	_____	_____
LEL		_____	_____
UEL		_____	_____

^a Only one is necessary.

^b For organic compounds, recovery of spilled material by solvent extraction may require solubility data.

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C. REACTIVITY HAZARD

	HAZARD? Yes No	CONCENTRATIONS	SOURCE
Reactivities:			
_____		_____	_____
_____		_____	_____

D. CORROSIVITY HAZARD

	HAZARD? Yes No	CONCENTRATIONS	SOURCE
pH _____			
Neutralizing agent:			
_____		_____	_____
_____		_____	_____

E. RADIOACTIVE HAZARD

	HAZARD? Yes No	EXPOSURE RATE	SOURCE
Background			
Alpha particles		_____	_____
Beta particles		_____	_____
Gamma radiation		_____	_____

3. DESCRIPTION OF INCIDENT:

Quantity involved _____
Release information _____
Monitoring/sampling recommended _____

4. RECOMMENDED PROTECTION

Worker _____
Public _____

5. RECOMMENDED SITE CONTROL:

Hotline _____
Decontamination line _____
Command Post location _____

6. REFERENCES FOR SOURCES:

